

ICOM

SERVICE MANUAL

144 MHz FM TRANSCEIVER

IC-229A
IC-229E
IC-229H

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MANUALE DI SERV. X
IC-229

05910406



2005910406001

Icom Inc.

INTRODUCTION

This service manual describes the latest information for the following transceivers at the time of publication.

| MODEL | VERSION NO. | VERSION | SYMBOL |
|---------|-------------|-----------|--------|
| IC-229H | #02 | Europe | EUR |
| IC-229E | #03 | Italy | ITA |
| | #05 | U.S.A. | USA |
| IC-229H | #07 | Australia | AUS |
| IC-229A | #08 | Asia | SEA |

To upgrade quality, all electrical or mechanical parts and internal circuits are subject to change without notice or obligation.

DANGER

NEVER connect the transceiver to an AC outlet or to a DC power supply that uses more than 16 V. This will ruin the transceiver.

DO NOT expose the transceiver to rain, snow or any liquids.

DO NOT reverse the polarities of the power supply when connecting the transceiver.

DO NOT apply an RF signal of more than 20 dBm (100 mW) to the antenna connector. This could damage the transceiver's front end.



ORDERING PARTS

Be sure to include the following four points when ordering replacement parts:

1. 10-digit order numbers
2. Component part number and name
3. Equipment model name and unit name
4. Quality required

<SAMPLE ORDER>

1150000010 IC SC1019 IC-229A/E MAIN UNIT 5 pieces
8810006010 Screw FH M3×5 ZK BS IC-229A/E Top cover 10 pieces

Addresses are provided on the inside back cover for your convenience.

REPAIR NOTE

1. Make sure a problem is internal before disassembling the transceiver.
2. **DO NOT** open the transceiver until the transceiver is disconnected from a power source.
3. **DO NOT** force any of the variable components. Turn them slowly and smoothly.
4. **DO NOT** short any circuits or electronic parts. An insulated tuning tool **MUST** be used for all adjustments.
5. **DO NOT** keep power ON for a long time when the transceiver is defective.
6. **DO NOT** transmit power into a signal generator or a sweep generator.
7. **ALWAYS** connect a 40 dB~ 50 dB attenuator between the transceiver and a deviation meter or spectrum analyzer when using such test equipment.
8. **READ** the instructions of test equipment thoroughly before connecting equipment to the transceiver.
9. Each band unit **MUST** be serviced after the IC-901A/E adjustments have been completed.

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SECTION 1 SPECIFICATIONS

■ GENERAL

- Frequency coverage

| MODEL | VERSION | RECEIVER | TRANSMITTER |
|-----------|-----------|----------------------|----------------------|
| IC-229A/H | U.S.A. | 136.000~174.000 MHz* | 140.000~150.000 MHz* |
| IC-229A/H | Australia | 144.000~148.000 MHz | 144.000~148.000 MHz |
| IC-229A/H | Asia | 136.000~174.000 MHz* | 140.000~150.000 MHz* |
| IC-229E/H | Europe | 144.000~146.000 MHz | 144.000~146.000 MHz |
| IC-229E/H | Italy | 136.000~176.000 MHz* | 136.000~174.000 MHz* |

* Specifications guaranteed 144~148 MHz.

- Mode : F3 (FM)
- Selectable tuning step (Initial) : 5,10, 12.5, 15, 20, 25 kHz or 1 MHz
- Memory channels : 20 plus 1 call channel
- Antenna impedance : 50Ω (unbalanced)
- Power supply requirement : 13.8 V DC±15% (negative ground)
- Current drain (IC-229H) : Receive 500 mA (squelched)
Transmit 4.0 A (LOW 1), 5.0 A (LOW 2), 7.5 A (LOW 3), 10.5 A (HIGH)
- Current drain (IC-229A/E) : Receive 500 mA (squelched)
Transmit 2.0 A (LOW 1), 3.2 A (LOW 2), 4.2 A (LOW 3), 6.0 A (HIGH)
- Usable temperature range : -10°C~+60°C (+14°F~+140°F)
- Frequency stability : ±10 ppm (-10°C~+60°C); (+14°F~+140°F)
- Dimensions : IC-229H 140 (W)×40 (H)×155 (D) mm; 5.5 (W)×1.6 (H)×6.1 (D) in
IC-229A/E 140 (W)×40 (H)×105 (D) mm; 5.5 (W)×1.6 (H)×4.1 (D) in
(Projections not included)
- Weight : IC-229H 1.0 kg (2.2 lb)
IC-229A/E 0.75 kg (1.7 lb)

■ TRANSMITTER

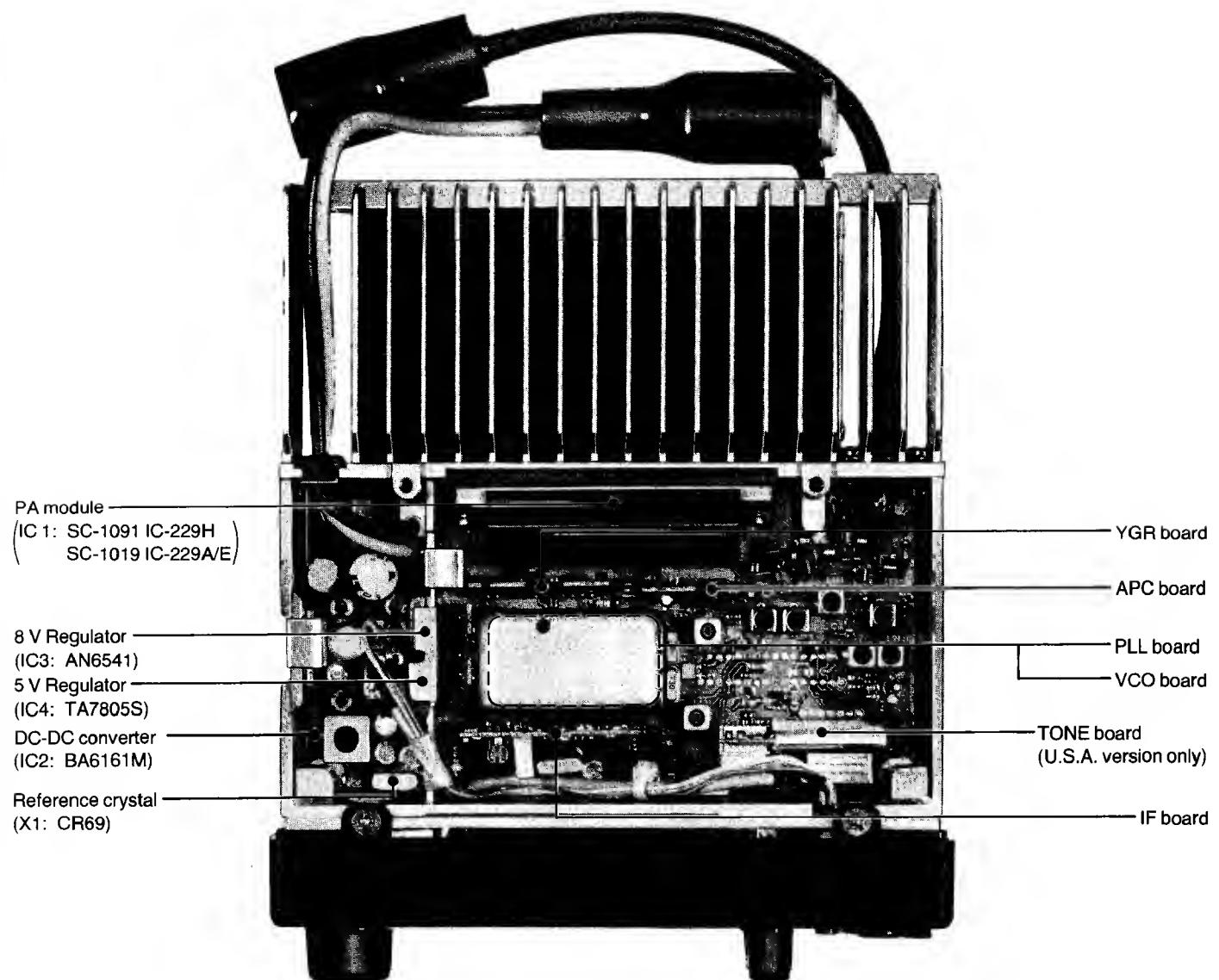
- Output power : IC-229H 50 W (HIGH), 25 W (LOW 3), 10 W (LOW 2), 5 W (LOW 1)
IC-229A/E 25 W (HIGH), 10 W (LOW 3), 5 W (LOW 2), 1 W (LOW 1)
- Modulation system : Variable reactance frequency modulation
- Max. frequency deviation : ±5 kHz
- Spurious emissions : Less than ±60 dB
- Microphone impedance : 600Ω

■ RECEIVER

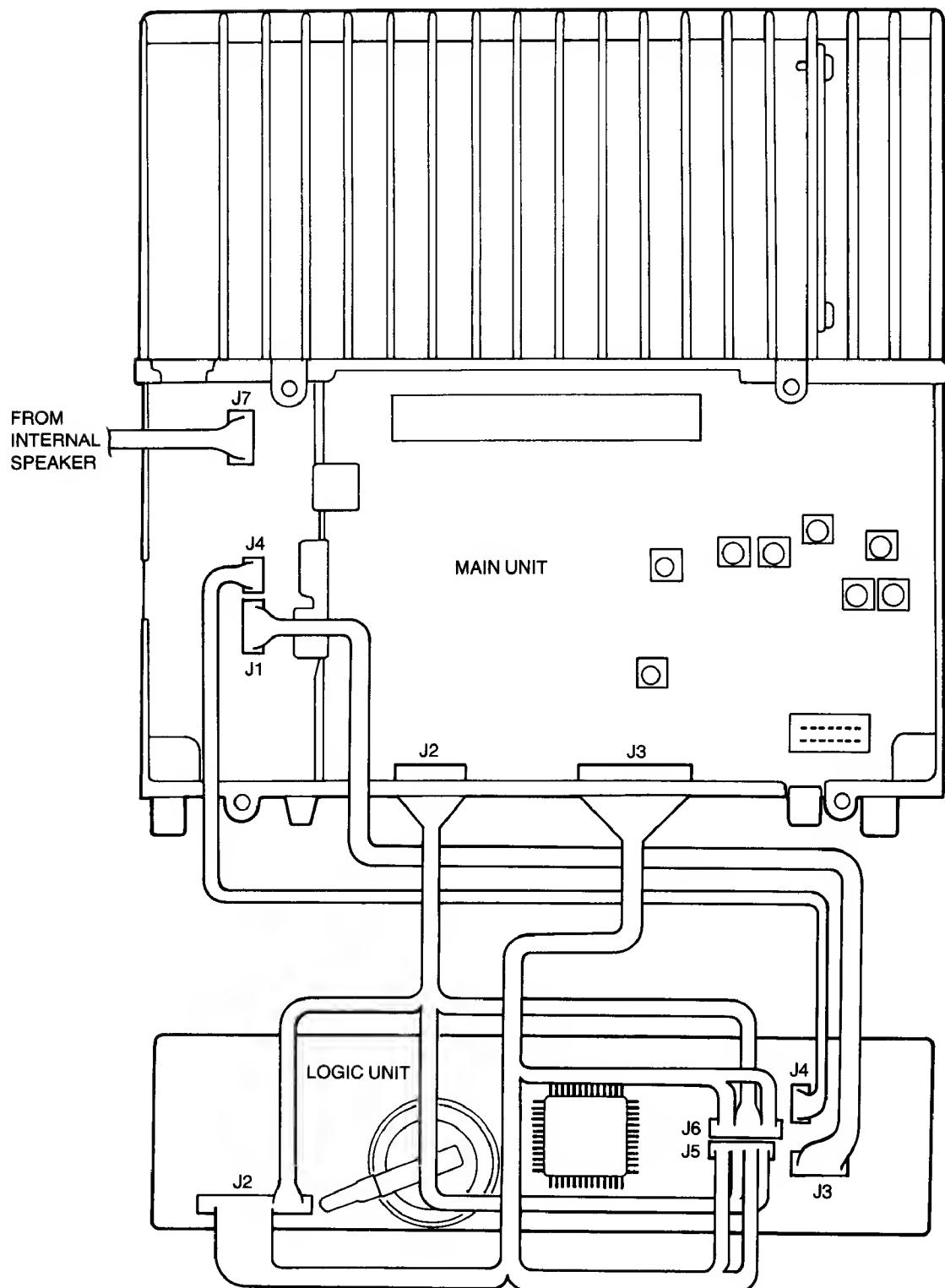
- Receive system : Double-conversion superheterodyne
- Intermediate frequencies : 1st 17.2 MHz
2nd 455 kHz
- Sensitivity : 0.18 µV for 12 dB SINAD
- Selectivity : More than 15 kHz/-6 dB
Less than 30 kHz/-60 dB
- Audio output power : More than 2.4 W at 10% distortion with an 8Ω load
- Audio output impedance : 8Ω

All stated specifications are subject to change without notice or obligation.

SECTION 2 INSIDE VIEWS



SECTION 3 CONNECTOR ASSEMBLY



SECTION 4 CIRCUIT DESCRIPTION

4-1 RECEIVER CIRCUITS

4-1-1 ANTENNA SWITCHING CIRCUIT (MAIN UNIT)

The antenna switching circuit switches the transmit/receive circuit, functions as a low-pass filter while receiving and as a resonator circuit while transmitting.

Received signals enter the antenna connector and pass through a low-pass filter (L8~L11, C29~C32). The signals are applied to an antenna switching circuit (D5), and then to an RF circuit via a low pass filter (L19, L20, C89, C101, D18).

4-1-2 RF CIRCUIT (MAIN UNIT)

The RF circuit amplifies signals within the range of frequency coverage, and filters out out-of-band signals.

The signals from the antenna switching circuit pass through a one-stage bandpass filter (D15, L18, C95), and are applied to an RF amplifier (Q19). Amplified signals are applied to 3-stage bandpass filters (D12~D14, L15~L17, C82, C85, C88), and are then applied to a 1st mixer (Q18). The bandpass filters suppress out-of-band signals.

D12~D15 are varactor diodes that track the bandpass filters and resonator circuits and are controlled by the lock voltage of the PLL. These diodes tune the center frequency of RF circuits for wide band width reception and good image response rejection.

4-1-3 1ST MIXER CIRCUIT (MAIN UNIT)

The 1st mixer circuit converts the received signal to a fixed frequency of the 1st IF signal using a PLL output frequency. By changing a PLL frequency, only the desired frequency can be passed through a crystal filter located at the next stage of the 1st mixer.

The signals from the RF circuit are mixed with a 1st LO signal from the VCO circuit to produce a 17.2 MHz 1st IF signal.

4-1-4 1ST IF CIRCUIT (MAIN UNIT)

The 1st IF circuit amplifies a signal which is converted in the 1st mixer circuit.

After passing through a matching circuit (L13, C70), the 1st IF signal is applied to a pair of crystal filters (FI1) to suppress out-of-band signals. The 1st IF signal is amplified at an IF amplifier (Q17) and then enters a demodulator circuit.

4-1-5 2ND IF CIRCUIT (IF UNIT)

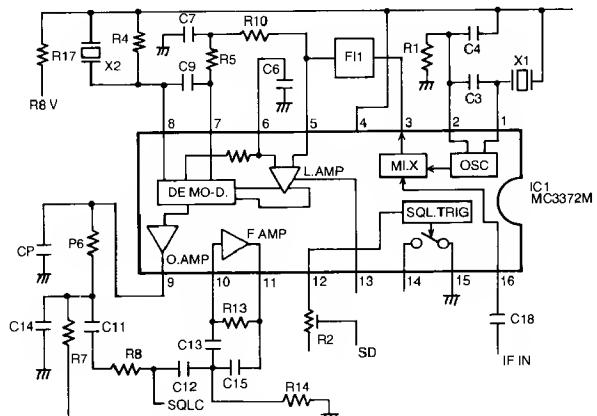
The 2nd mixer circuit converts the 1st IF signal to a 2nd IF signal. A double superheterodyne system (which converts the receive signal twice) improves the image rejection ratio and obtains stable receiver gain.

The 1st IF signal from Q17 is applied to a 2nd mixer section of IC1, and mixed with a 2nd LO signal to be converted to a 455 kHz 2nd IF signal.

IC1 contains the 2nd mixer, the local oscillator, limiter amplifier and quadrature detector circuits. The local oscillator section and X2 generates 16.745 MHz for the 2nd LO signal.

The 2nd IF signal from the 2nd mixer (IC1, pin 3) passes through a ceramic filter (FI1), where unwanted signals are suppressed. It is then amplified at the limiter amplifier section (IC1, pin 5) and applied to the quadrature detector section (IC1, pin 10 and ceramic discriminator X2) to demodulate the 2nd IF signal into an AF signal.

AF signals output from IC1 (pin 9) are applied to a squelch circuit and de-emphasis circuit (R7, C14). The de-emphasis circuit is an integrated circuit with frequency characteristics of -6 dB/octave. The resulting signal is applied to the AF circuit.



IF CIRCUIT

4-1-6 SQUELCH CIRCUIT (IF UNIT)

The squelch circuit cuts out AF signals when no RF signal is received. By detecting noise components in the AF signals, the squelch circuit switches the AF control circuits.

Some of the noise components in the AF signals from IC1 (pin 9) are applied to IC1 (pin 10). The [SQL] control (R41) on the LOGIC unit adjusts the IC1 (pin 10) input level.

The active filter section in IC1 amplifies noise components of frequencies of 20 kHz and above, and outputs the resulting signal from IC1 (pin 11). Output signals are rectified by D2 and are converted to DC voltage.

The DC voltage triggers the squelch switch (Q5). The signal is applied to the CPU (IC4, pin 18) on the LOGIC UNIT through the SQLS signal line.

4-1-7 AF CIRCUIT (MAIN UNIT)

The AF circuit amplifies the signals to drive a speaker. The AF circuit includes a mute circuit to mute a signal with a noise squelch.

The AF OUT signal through DETMUTE switch Q24, the BEEP signal, and the DTMF monitor signal buffered at Q21 are adjusted with the volume control on the front panel.

AF amplifier IC7 amplifies the signals to a sufficient level to drive the speaker. Mute transistor Q33 turns ON to cut the signal to be input to AF amplifier IC7 during TX and squelch operation.

If an external speaker is connected, the internal speaker is automatically disconnected.

4-2 TRANSMITTER CIRCUITS

4-2-1 MICROPHONE AMPLIFIER (MIC AMP UNIT)

The microphone amplifier circuit amplifies audio signals with +6 dB/octave pre-emphasis from the microphone to a level needed at the modulation circuit.

An AF signal from the microphone is applied to microphone preamplifier Q1 through the MIC line. IC1b functions as an amplifier as well as a limiter for frequency deviation. IC1b also functions as a pre-emphasis circuit with -6 dB/octave characteristics.

4-2-2 MODULATION CIRCUIT (MIC AMP AND VCO UNITS)

The modulation circuit oscillates the transmit frequency with AF signal modulation.

The signal is filtered by a low-pass filter consisting of IC1a. IC1b has a feedback circuit which functions as a pre-emphasis circuit with +6 dB/octave characteristics.

The filtered signal is applied to the VCO circuit for FM modulation.

4-2-3 DRIVE AMPLIFIER CIRCUIT (YGR UNIT)

The drive amplifier circuit amplifies the VCO oscillating signal.

The VCO output (OUT1) filtered by a low-pass filter are amplified to approximately 25 dBm (approx. 300 mW) at Q1 and Q2 on the YGR UNIT.

4-2-4 POWER AMPLIFIER CIRCUIT (MAIN UNIT)

The power amplifier circuit amplifies the drive signal.

The amplified signal is applied to IC1 (pin 1). IC1 is a power module and amplifies the signals to approximately 55 W and 30 W for H type and A/E type respectively.

The output signal from IC1 (pin 4) is applied to D5 and then to a low-pass filter consisting of L8~L11 and C29~C32. The low-pass filter attenuates unwanted harmonic signals.

4-2-5 ANTENNA SWITCHING CIRCUIT (MAIN UNIT)

The antenna switching circuit applies the received signal to a receiver circuits and the transmitter signal to the antenna connector.

When transmitting, a diode switching circuit consisting of D17, D18 and D5 is turned ON by a signal of T8V. Transmit signals are applied to the antenna connector through the low-pass filter.

When receiving, the diode switching circuit is turned OFF and received signals are applied to P1 through a π -type filter consisting of L19, L20 and C99~C101. The filter attenuates unwanted harmonic signals.

4-2-6 APC CIRCUIT (APC UNIT)

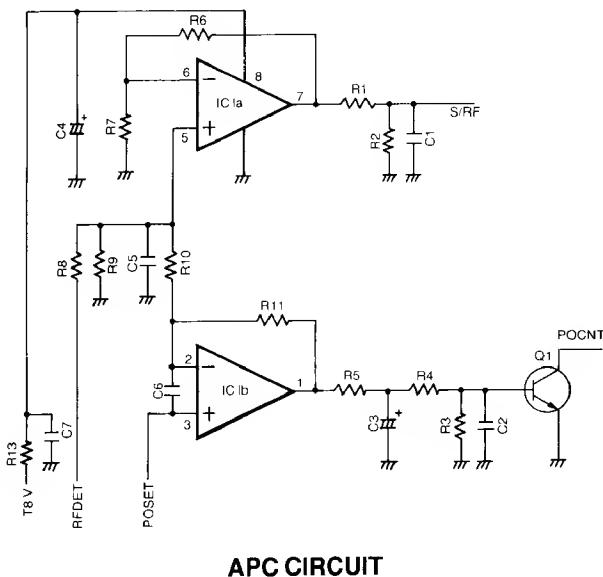
The APC circuit protects the power module from a mismatched output road and selects HIGH or LOW output power.

D3, D4, L6, R26~R29, C24 and C25 forms a mismatching detector circuit.

When the impedance of the connected antenna is matched with 50Ω , detected voltage at D3 and D4 is at a minimum. However, the voltage increases when the antenna impedance is not matched with 50Ω .

The detected voltage is applied to IC1 (pin 2) and a reference voltage is applied to IC1 (pin 3). Pins 2 and 3 form differential inputs and IC1 functions as a differential amplifier. The relation between the detected voltage level and output voltage level at IC1 (pin 1) is an inverse proportion.

If output power from IC1 (pin 4) is increased, detected voltage by D3 and D4 increases. The voltage is applied to IC1 (pin 1) output level becomes lower than when the output power is normal. The base voltage of Q1 becomes lower and the collector of Q9 on the MAIN UNIT also becomes lower. Therefore, applied voltages to the collector of Q2 on the YGR UNIT and IC1 (pin 2) on the MAIN UNIT decrease and the output power is controlled at a constant level.



APC CIRCUIT

4-3 PLL CIRCUITS (PLL UNIT)

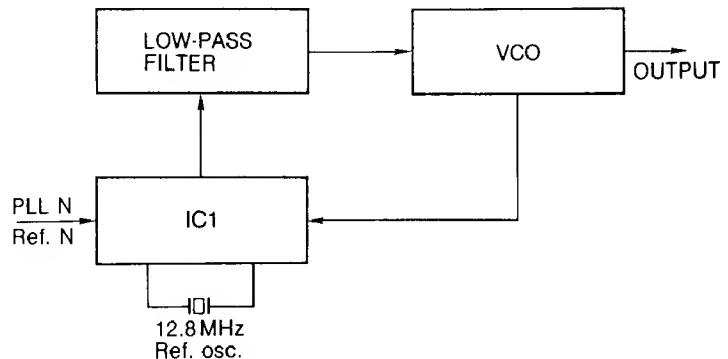
4-3-1 GENERAL

The PLL circuit steadily oscillates the transmit frequency and the receive local frequency. The PLL output frequency is controlled by the divided ratio of the programmable divider.

IC1 is one package of the PLL IC chip. The IC functions as a phase detector, reference oscillator, fixed divider and programmable divider.

IC1 accepts 200 MHz signals directly and divides them without a mixer or prescaler. Therefore, an important feature in IC1 is that it generates few spurious components.

The VCO output frequency is set by data signals from IC1 on the LOGIC UNIT.



PLL CIRCUIT BLOCK DIAGRAM

4-3-2 VCO CIRCUIT (VCO UNIT)

The VCO circuit generates receive and transmit frequencies and produces FM modulation.

The VCO circuit forms a Hartley oscillator circuit. Q1 oscillates the desired signal and Q2 functions as a buffer amplifier.

The higher harmonics of the OUT1 output signal is attenuated in the LPF consisting of L2, L3, C13, C14, and C15. It is sent to the Mixer circuit as the LO signal during transmission, and to the YGR section during reception.

The reference frequency signal entered in IC1 (PLL) is divided into the reference frequency in the reference program counter in IC1 (PLL) and then compared with the OUT2 output signal. The resulting difference is output as a pulse.

4-3-3 REFERENCE OSCILLATOR (MAIN UNIT)

The reference oscillator circuit oscillates the PLL reference frequency.

IC1 has an oscillator circuit for the PLL reference frequency signal in the chip. X1 is a crystal unit for oscillating a signal of 12.8 MHz.

4-3-4 CHARGE PUMP AND LOOP FILTER CIRCUITS (PLL UNIT)

These circuits convert the phase-detected signal to a DC voltage.

Phase-detected signals from pins 5 and 12 of the IC1 are converted to DC voltage by a charge pump circuit consisting of Q5~Q7. The signal is then applied to a low-pass filter circuit consisting of R2, R3, R8 and C1~C3.

Filtered DC voltage is applied to D1 and D2 in the VCO circuit for controlling the VCO output frequency and the gate of Q1 for producing receiver tuning voltages.

4-4 OTHER CIRCUITS

4-4-1 REGULATOR CIRCUITS (MAIN UNIT)

The regulator circuit converts +13.8 V DC to the voltage needed by each circuit.

IC3 is a 3-terminal voltage regulator IC chip. +13.8 V is applied to pin 1 and pin 3 output +8 V.

The regulated voltage is applied to each unit.

IC4 is a 3-terminal voltage regulator IC chip. +13.8 V is applied to an input terminal and the output terminal outputs +5 V.

IC2 is a voltage converter for applying approximately 30 V DC to the receiver RF circuit.

4-4-2 SUBAUDIBLE TONE ENCODER CIRCUIT (TONE UNIT)

IC5 is an IC chip for converting input data from serial to parallel form. The data is sent from IC4 on the LOGIC UNIT. IC1 is an IC chip for generating subaudible tone frequency signals from 67 Hz~250.3 Hz.

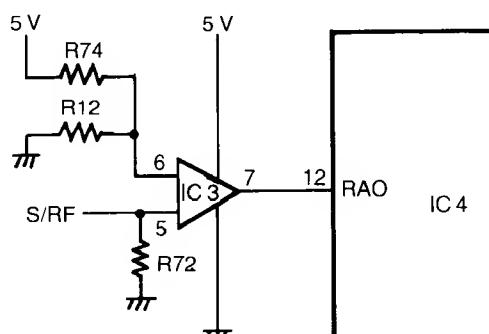
4-5 LOGIC CIRCUITS (LOGIC UNIT)

4-5-1 S/BF INDICATOR CIRCUIT

- Relative signal strength indicator

The S/RF meter detection circuit of the indicator contains comparator IC3 and the 4-bit D/A converter consisting of 4 output ports of CPU (IC4) and resistors for the relative signal. The S/RF signal is applied to IC3 (pin 5). The relative signal is applied to IC3 (pin 6). The relative signal voltage changed by the 4-bit binary output signal from CPU IC4 is compared with the voltage detected by the S/RF meter.

The output signal from IC3 (pin 7) is read by the CPU and the detected voltage is indicated.



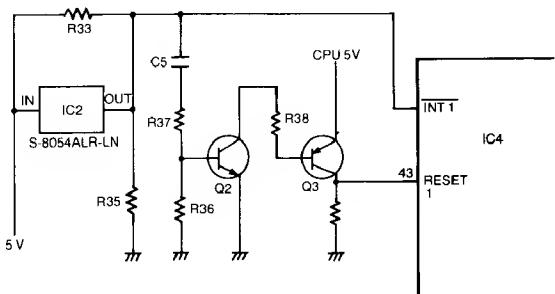
S/RF INDICATOR CIRCUIT

- RF output power selection indicator

The gain of IC1 a is set very high, so the output voltage at IC1a (pin 7) is saturated even if the input RF level is small. Then the "HIGH" voltage is applied to IC3 (pin 5) on the LOGIC.

4-5-2 RESET CIRCUIT

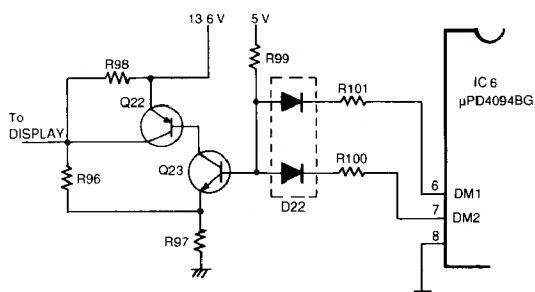
The CPU is reset when the RESET port changes from “HIGH” to “LOW” and then becomes “LOW” again. The RESET port remains “HIGH” except when the CPU is reset.



RESET CIRCUIT

4-5-3 DIMMER CIRCUIT

The 4 brightness level of the FUNCTION DISPLAY change by using combinations of output level at pin 6 and pin 7. By changing levels at DM1 and DM2, the base voltage and collector current changes. Therefore, the collector voltage is changed and brightness of lamps DS2, DS3 change.



DIMMER CIRCUIT

Scan by Dan

4-5-4 CPU PORT ALLOCATIONS

| PIN NO. | Port Name | Signal Name | Description |
|---------|-----------|-------------|-------------------------------------|
| 1 | R01 | KEY S0 | Initial matrix strobe signal output |
| 2 | R02 | KEY S1 | Initial matrix strobe signal output |
| 3 | R03 | KEY S2 | Initial matrix strobe signal output |
| 4 | R10 | KEY I0 | Initial matrix return signal input |
| 5 | R11 | KEY I1 | Initial matrix return signal input |
| 6 | R12 | KEY I2 | Initial matrix return signal input |
| 7 | R13 | KEY I3 | Initial matrix return signal input |
| 8 | R20 | SRF O0 | A/D Decode data output |
| 9 | R21 | SRF O1 | A/D Decode data output |
| 10 | R22 | SRF O2 | A/D Decode data output |
| 11 | R23 | SRF O3 | A/D Decode data output |
| 12 | RA0 | SRF I | Detects an S/RF meter signal |
| 13 | RA1 | PTT | Detects a PTT signal |
| 14 | R30 | DIAL-UP | DIAL up input |
| 15 | R31 | DIAL-DN | DIAL down input |
| 16 | R32 | DIAL-CK | DIAL U/D clock input |
| 17 | R33 | BACK-UP | Back up request input |
| 18 | R50 | SQLS | SQL input |
| 19 | R51 | — | Not used |
| 20 | R52 | UNLK | Un-lock input |
| 21 | R53 | — | Not used |
| 22 | R60 | STBCC | Common control output |
| 23 | R61 | STBOT | TSQL unit control output |
| 24 | R62 | STBOD | DTMF unit control output |
| 25 | R63 | CE | LCD drive select output |
| 26 | — | VCC | Connected to 5 V input |
| 27 | R40 | SCK | Serial clock output |
| 28 | R41 | SI | Serial data input |
| 29 | R42 | SO | Serial data output |
| 30 | R43 | P/S | Control signal output |
| 31 | R70 | MIC-U/D | MIC up input |
| 32 | R71 | MIC-CK | MIC clock input |
| 33 | R72 | MW | SW input |
| 34 | R73 | MONI | SW input |
| 35 | R80 | SET | SW input |
| 36 | R81 | H/L | SW input |
| 37 | R82 | PGR/CS | SW input |
| 38 | R83 | T/TSQL | SW input |
| 39 | R90 | DIM | SW input |
| 40 | R91 | PRIO | SW input |
| 41 | R92 | M/CALL | SW input |
| 42 | R93 | V/M | SW input |
| 43 | — | RESET | Reset signal input |
| 44 | TEST | — | Not used |
| 45 | OSC1 | MPU OSC | OSC input |
| 46 | OSC2 | MPU OSC | OSC output |
| 47 | — | GND | Connected to GND |
| 48 | D0 | — | Not used |
| 49 | D1 | STB PL | PLL strobe output |
| 50 | D2 | S-TONE | Tone oscillation (88.5 kHz) output |

51~64 are not used.

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SECTION 5 MECHANICAL PARTS AND DISASSEMBLY

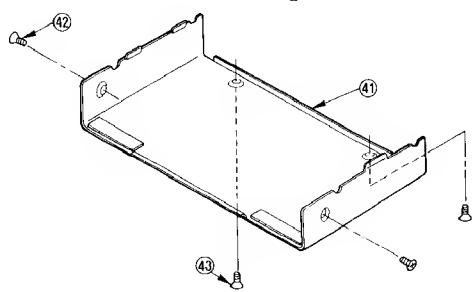
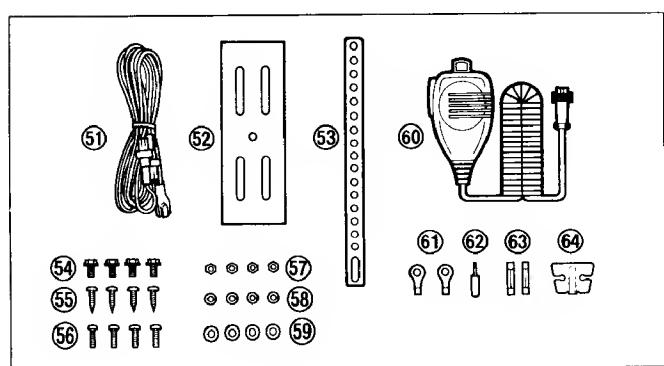
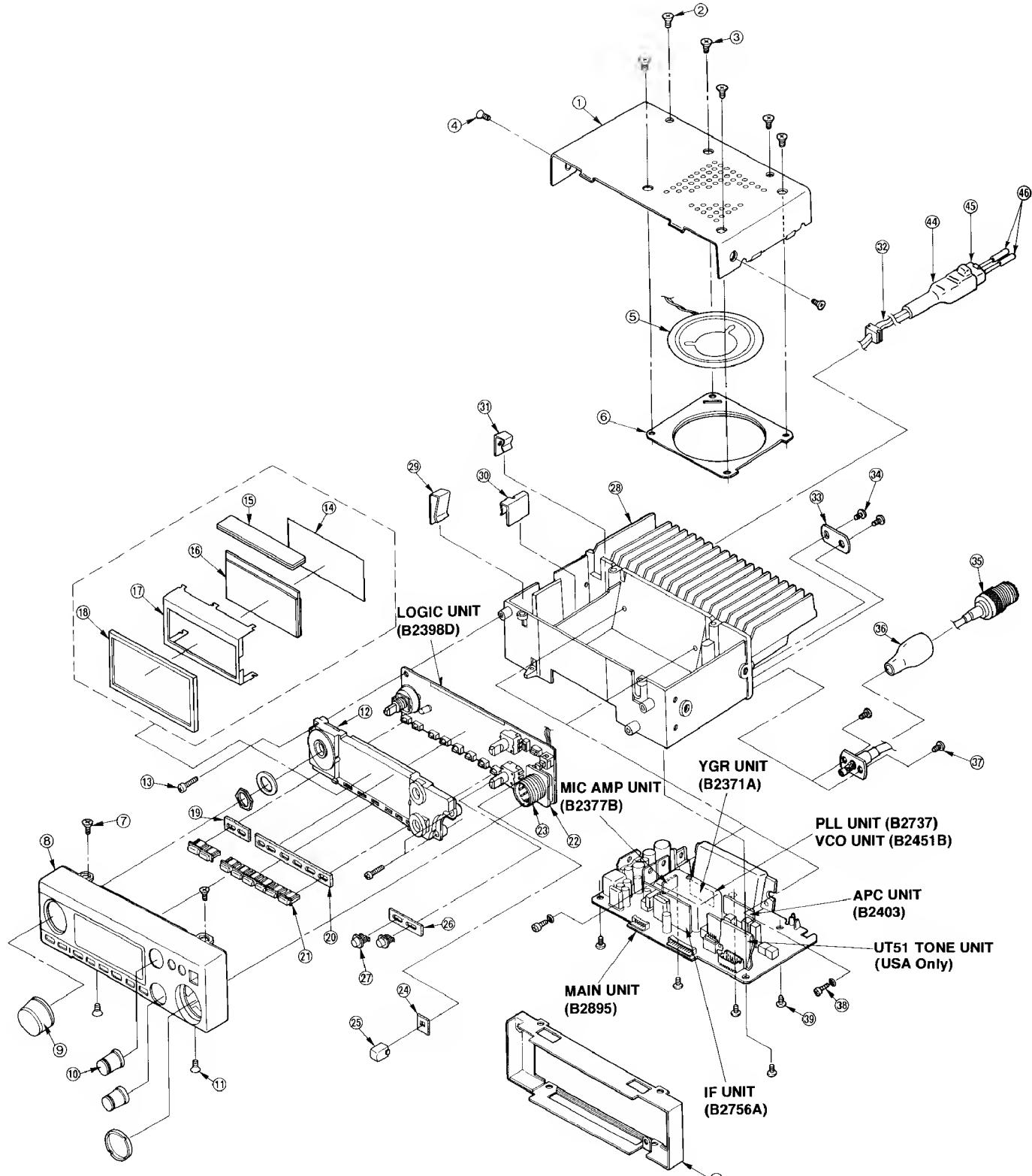
5-1 TRANSCEIVER

| LABEL NUMBER | ORDER NO. | DESCRIPTION | QTY. | LABEL NUMBER | ORDER NO. | DESCRIPTION | QTY. |
|--------------|------------|-------------------------------------|------|--------------|------------|------------------------------------|------|
| ① | 8110004080 | Top cover (IC-229A/E) (incl. ③,⑤,⑥) | 1 | ㉓ | 6510000290 | Mic connector 8S-S-E | 1 |
| | 8110004040 | Top cover (IC-229H) (incl. ③,⑤,⑥) | 1 | ㉔ | 8310019961 | Switch sheet-1 | 1 |
| ㉕ | 8810006010 | Screw FH M3×5 BS | 2 | ㉕ | 8610006530 | Button K151 | 1 |
| ㉖ | 8810006230 | Screw FH M2.6×4 ZK | 4 | ㉖ | 8930017770 | Switch sponge | 1 |
| ㉗ | 8810006010 | Screw FH M3×5 BS | 2 | ㉗ | 8610006510 | Button K152 | 2 |
| ㉘ | 2510000470 | Speaker EAS-6P100SA | 1 | ㉘ | 8010009790 | 869 chassis (IC-229A/E) | 1 |
| ㉙ | 8930017810 | 833 Speaker holder | 1 | | 8010009830 | 835 chassis (IC-229H) | 1 |
| ㉚ | 8810002160 | Screw FH M3×5 | 2 | ㉚ | 8930017940 | AF-IC slider | 1 |
| ㉛ | 8210005650 | Front panel (IC-229A) | 1 | ㉛ | 8930018510 | IC-slider | 1 |
| | 8210005660 | Front panel (IC-229E) | 1 | ㉛ | 8930017950 | TR-slider | 1 |
| | 8210005670 | Front panel (IC-229H) | 1 | ㉛ | 8900002720 | Power supply cable OPC-251 | 1 |
| ㉜ | 8610006500 | Knob N154 [MAIN DIAL] | 1 | ㉜ | 8510006440 | ANT plate | 1 |
| ㉝ | 8610006490 | Knob N153 [VOL, SQL] | 2 | ㉝ | 8810001900 | Screw FH M3×5 Ni BS | 2 |
| ㉞ | 8810002160 | Screw FH M3×5 | 2 | ㉞ | 8900002450 | ANT cable OPC-223 | 1 |
| ㉟ | 8010009740 | LCD reflector | 1 | ㉟ | 6950000040 | M-type cap (Black) | 1 |
| ㉟ | 8810000260 | Screw PH M3×12 | 3 | ㉟ | 8810001900 | Screw FH M3×5 Ni BS | 2 |
| ㉟ | 8930017500 | LCD filter | 1 | ㉟ | 8810003250 | Screw PH M3×8 Ni | 2 |
| ㉟ | 8930017730 | LCD contact strip SRCN-833-W | 1 | ㉟ | 8810001350 | Screw PH M3×6 | 5 |
| ㉟ | 5030000560 | LCD LD-BU9496E | 1 | ㉟ | 8510006450 | LOGIC shield | 1 |
| ㉟ | 8930017760 | LCD holder | 1 | ㉟ | 8110003880 | Bottom cover | 1 |
| ㉟ | 8930017690 | LCD rubber | 1 | ㉟ | 8810006010 | Screw FH M3×5 BS | 2 |
| ㉟ | 8930018350 | Switch sponge (B) | 1 | ㉟ | 8810006010 | Screw FH M3×5 BS | 2 |
| ㉟ | 8930018340 | Switch sponge (A) | 1 | ㉟ | 6950000180 | Connector cover (included in ㉟) | 2 |
| ㉟ | 8610006520 | Button K150 | 8 | ㉟ | 6510004780 | Connector LR-02-1V (included in ㉟) | 1 |
| ㉟ | 8930012430 | 543 Mic spacer | 1 | ㉟ | 6510005150 | Pin SLM61T-2.0 (included in ㉟) | 2 |

Screw abbreviations PH: Pan head FH: Flat head B0: Self-tapping screw ZK: Black Ni: Nickel

5-2 ACCESSORIES

| LABEL NUMBER | ORDER NO. | DESCRIPTION | QTY. | LABEL NUMBER | ORDER NO. | DESCRIPTION | QTY. |
|--------------|------------------|----------------------------------|------|--------------|------------------|----------------------------|------|
| ㉟ | Optional product | Power cable OPC-044B (IC-229A/E) | 1 | ㉟ | 8850000150 | Flat washer M5 Ni BS | 4 |
| | Optional product | Power cable OPC-025A (IC-229H) | 1 | ㉟ | Optional product | Microphone HM56 (USA) | 1 |
| ㉟ | 8010005180 | Mounting bracket (B) | 1 | | Optional product | Microphone HM58 (AUS, SEA) | 1 |
| ㉟ | 8010004060 | Mounting support bracket | 1 | | Optional product | Microphone HM59 (EUR, ITA) | 1 |
| ㉟ | 8820000530 | Mounting bolt | 1 | ㉟ | 6510003070 | Cable lug R5.5-8 | 2 |
| ㉟ | 8810000950 | Screw PH A M5×16 | 4 | ㉟ | 5610000020 | AP313 3.5φ CS plug | 1 |
| ㉟ | 8810000470 | Screw PH M5×12 (+ -) | 4 | ㉟ | 5210000120 | Fuse FGP 15 A (IC-229A/E) | 2 |
| ㉟ | 8830000120 | Nut M5 | 4 | | 5210000080 | Fuse FGP 20 A (IC-229H) | 2 |
| ㉟ | 8850000440 | Spring washer N5 Ni | 4 | ㉟ | 8930007300 | Microphone hanger | 1 |



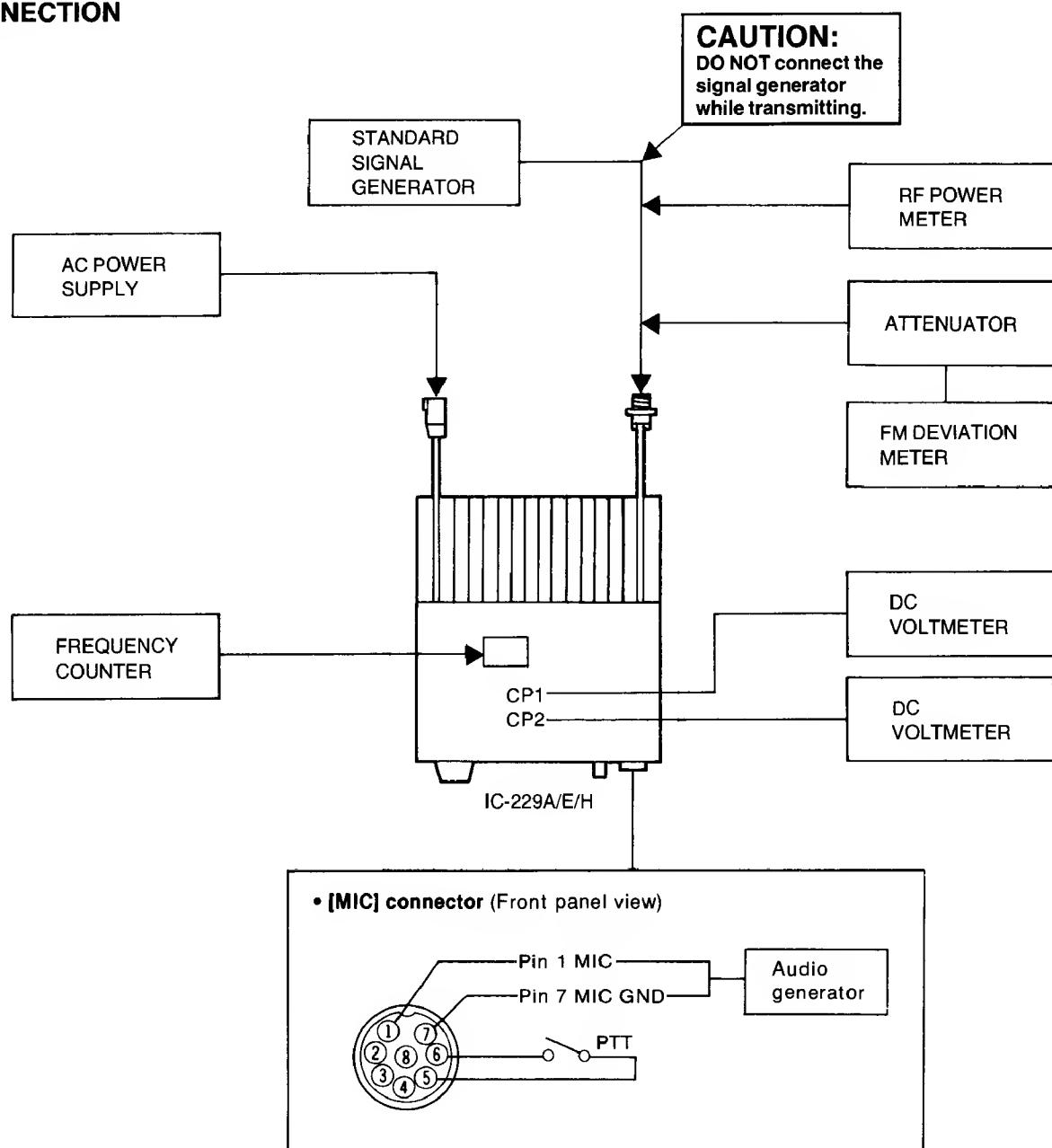
SECTION 6 ADJUSTMENT PROCEDURES

6-1 PREPARATION BEFORE SERVICING

■ REQUIRED TEST EQUIPMENT

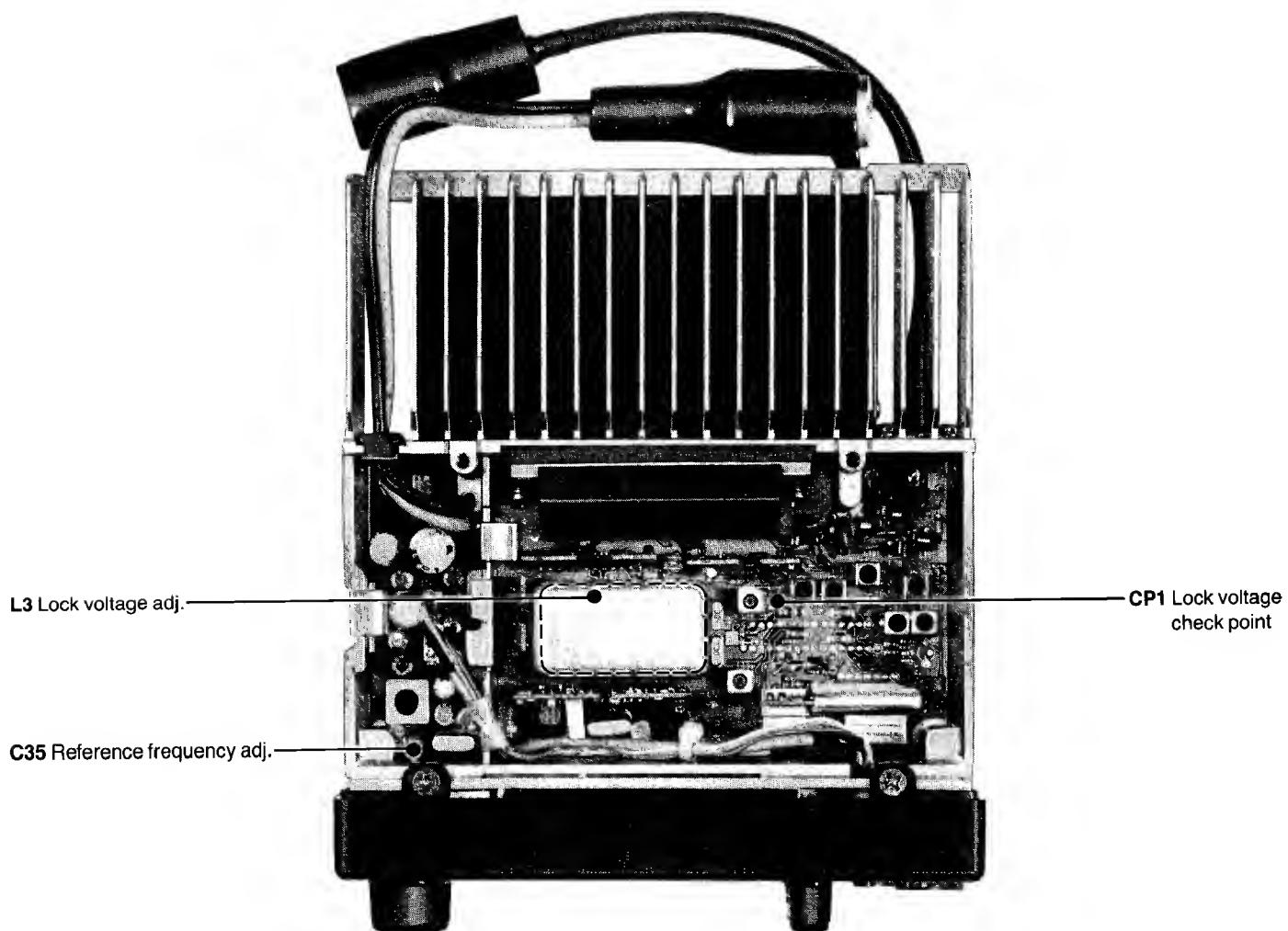
| EQUIPMENT | GRADE AND RANGE | EQUIPMENT | GRADE AND RANGE |
|-------------------|---|--|---|
| AC power supply | Output voltage : 13.8 V DC \pm 15% Current capacity : 15 A or more | Attenuator | Attenuation : 40 dB or 50 dB Capacity : At least 50 W |
| RF power meter | Terminated type Measuring range : 100 W Frequency range : 150 MHz Input impedance : 50 Ω SWR : 1.2:1 or better | Standard signal generator | Frequency range : 0.1~180 MHz Output level : -127~-17 dBm (0.1 μ V~32 mV) |
| | AF generator | Frequency range : 200~2000 Hz Output range : 2~200 mV | |
| Frequency counter | Frequency minimum : 150 MHz Frequency accuracy : 1 ppm or better Sensitivity : 100 mV or better | FM deviation meter | Frequency minimum : 150 MHz Measuring range : 0~ \pm 10 kHz |
| DC voltmeter | Input impedance : 50 k Ω /V DC or better | | |

■ CONNECTION



6-2 PLL ADJUSTMENT

| ADJUSTMENT | | ADJUSTMENT CONDITIONS | MEASUREMENT | | VALUE | ADJUSTMENT POINT | |
|---------------------|---|--|-------------|--|-------------|------------------|--------|
| | | | UNIT | LOCATION | | UNIT | ADJUST |
| LOCK VOLTAGE | 1 | •Frequency display: 146.000 MHz | MAIN | Connect the DC voltmeter to CP1. | 8 V | VCO | L3 |
| REFERENCE FREQUENCY | 1 | •Frequency display: 145.000 MHz •Transmitting | MAIN | Loosely couple the frequency counter to the ANTENNA CONNECTOR. | 145.000 MHz | MAIN | C35 |



6-3 RECEIVER ADJUSTMENT

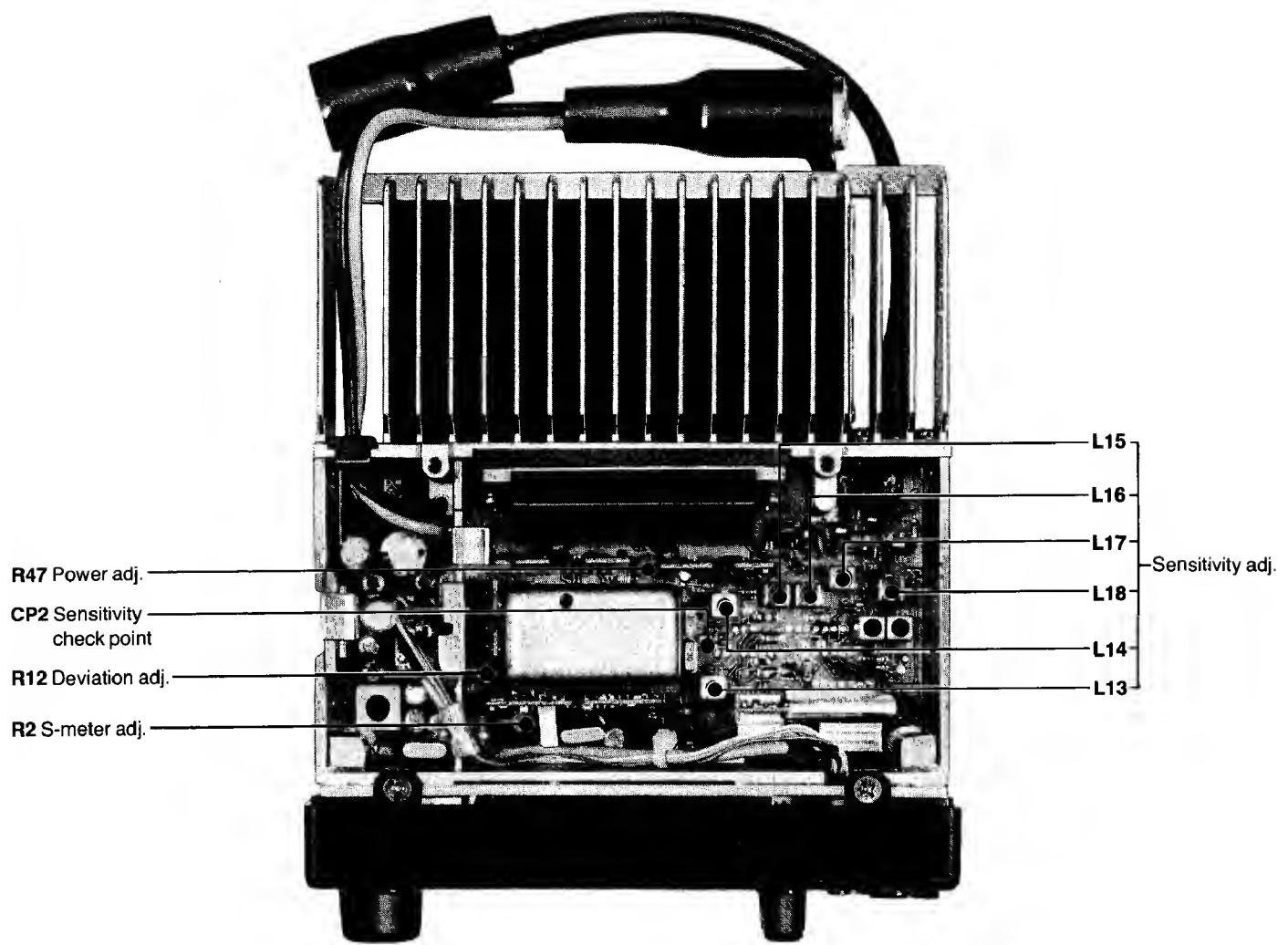
| ADJUSTMENT | | ADJUSTMENT CONDITIONS | MEASUREMENT | | VALUE | ADJUSTMENT POINT | |
|-------------|---|---|------------------|--------------------------------------|-------------|------------------|--|
| | | | UNIT | LOCATION | | UNIT | ADJUST |
| SENSITIVITY | 1 | <ul style="list-style-type: none"> Frequency display: 145.000 MHz Set the signal generator; Level: 3.16 μV* (-97 dBm) Dev.: ± 3.5 kHz Mod.: 1 kHz R2: Max. counterclockwise Receiving | MAIN | Connect the DC voltmeter to the CP2. | Maximum | MAIN | Adjust in sequence L18 L17 L16 L15 |
| | 2 | <ul style="list-style-type: none"> Set the signal generator; Level: 3.16 μV* (-97 dBm) Dev.: ± 7 kHz | | | | | L14 L13 |
| | | NOTE: Adjust the signal generator output each time until the DC voltmeter is at 30% on the full scale reading of the lowest range. | | | | | |
| S-METER | 1 | <ul style="list-style-type: none"> Frequency display: 145.000 MHz Set the signal generator; Level: 1 μV* (-107 dBm) Dev.: ± 3.5 kHz Mod.: 1 kHz Receiving | Function display | S/RF indicator | S3 (4 dots) | IF | R2 |

*This output level of standard signal generator (SSG) is indicated as SSG's open circuit.

6-4 TRANSMITTER ADJUSTMENT

| ADJUSTMENT | | ADJUSTMENT CONDITIONS | MEASUREMENT | | VALUE | ADJUSTMENT POINT | |
|--------------|---|--|-------------|---|------------------------------------|------------------|--------|
| | | | UNIT | LOCATION | | UNIT | ADJUST |
| OUTPUT POWER | 1 | <ul style="list-style-type: none"> Frequency display: 145.000 MHz Output power: HIGH Transmitting | Rear panel | Connect the RF power meter to the ANTENNA CONNECTOR. | 25 W (IC-229A/E) 50 W (IC-229H) | MAIN | R47 |
| DEVIATION | 1 | <ul style="list-style-type: none"> Frequency display: 146.000 MHz Apply an AF signal to the MIC CONNECTOR. Level: 20 mV/1 kHz (except USA) 65 mV/1 kHz (USA) Set the FM deviation meter; HPF: 50 Hz LPF: 20 kHz TONE: OFF Transmitting | Rear panel | Connect the FM deviation meter to the ANTENNA CONNECTOR via the attenuator. | ± 4.8 kHz | MAIN | R12 |

Scan by Dan



SECTION 7 PARTS LIST

[LOGIC UNIT]

| REF. NO. | ORDER NO. | DESCRIPTION |
|----------|------------|---|
| IC1 | 1130004190 | IC LC7582A |
| IC2 | 1110001500 | IC S-8054ALR-LN-T1 |
| IC3 | 1120000430 | IC LA6393M-TP-T1 |
| IC4 | 1140001460 | IC HD404019A38FS |
| IC5 | 1130003920 | IC TC4S69F (TE85R) |
| Q1 | 1590000410 | Transistor RN2404 (TE85R) |
| Q2 | 1530000160 | Transistor 2SC2712-Y (TE85R) |
| Q3 | 1510000110 | Transistor 2SA1162-Y (TE85R) |
| Q4 | 1530000160 | Transistor 2SC2712-Y (TE85R) |
| Q5 | 1530000160 | Transistor 2SC2712-Y (TE85R) |
| Q6 | 1530000160 | Transistor 2SC2712-Y (TE85R) |
| Q7 | 1530001950 | Transistor 2SC2712-GR (TE85R) |
| D1 | 1750000030 | Diode 1SS187 (TE85R) IC-229A/H (U.S.A. SEA) |
| | 1750000040 | Diode 1SS190 (TE85R) IC-229A/H (AUS) |
| | 1750000010 | Diode 1SS181 (TE85R) IC-229E/H (EUR) |
| D2 | 1750000030 | Diode 1SS187 (TE85R) IC-229E/H (ITA) |
| D3 | 1710000600 | Diode 1SS254 |
| D5 | 1710000600 | Diode 1SS254 |
| D6 | 1710000600 | Diode 1SS254 |
| D9 | 1750000030 | Diode 1SS187 (TE85R) |
| D10 | 1750000010 | Diode 1SS181 (TE85R) |
| D11 | 1750000050 | Diode 1SS193 (TE85R) |
| D12 | 1750000050 | Diode 1SS193 (TE85R) |
| D13 | 1730000840 | Zener RD9.1M-T2B2 |
| D14 | 1750000050 | Diode 1SS193 (TE85R) |
| DS1 | 5030000560 | LCD LD-BU9496E (E-5141-4) |
| DS2 | 5080000150 | LED HRS-7219A |
| DS3 | 5080000150 | LED HRS-7219A |
| X1 | 6060000230 | Crystal FAR-C4CA-04194000-M01 |
| R1 | 7030003640 | Resistor ERJ3GEYJ 473 V (47 kΩ) |
| R2 | 7030003640 | Resistor ERJ3GEYJ 473 V (47 kΩ) |
| R3 | 7030003640 | Resistor ERJ3GEYJ 473 V (47 kΩ) |
| R4 | 7030003640 | Resistor ERJ3GEYJ 473 V (47 kΩ) |
| R5 | 7030003640 | Resistor ERJ3GEYJ 473 V (47 kΩ) |
| R6 | 7030003640 | Resistor ERJ3GEYJ 473 V (47 kΩ) |
| R7 | 7030003640 | Resistor ERJ3GEYJ 473 V (47 kΩ) |
| R8 | 7030003640 | Resistor ERJ3GEYJ 473 V (47 kΩ) |
| R9 | 7030003640 | Resistor ERJ3GEYJ 473 V (47 kΩ) |
| R10 | 7030003640 | Resistor ERJ3GEYJ 473 V (47 kΩ) |
| R11 | 7030003600 | Resistor ERJ3GEYJ 223 V (22 kΩ) |
| R12 | 7030003520 | Resistor ERJ3GEYJ 472 V (4.7 kΩ) |
| R13 | 7030003760 | Resistor ERJ3GEYJ 474 V (470 kΩ) |
| R14 | 7030003720 | Resistor ERJ3GEYJ 224 V (220 kΩ) |
| R15 | 7030003680 | Resistor ERJ3GEYJ 104 V (100 kΩ) |
| R16 | 7030003640 | Resistor ERJ3GEYJ 473 V (47 kΩ) |
| R17 | 7030003640 | Resistor ERJ3GEYJ 473 V (47 kΩ) |
| R18 | 7030003640 | Resistor ERJ3GEYJ 473 V (47 kΩ) |
| R19 | 7030003600 | Resistor ERJ3GEYJ 223 V (22 kΩ) |
| R20 | 7030003600 | Resistor ERJ3GEYJ 223 V (22 kΩ) |
| R21 | 7030003800 | Resistor ERJ3GEYJ 105 V (1 MΩ) |
| R22 | 7030003640 | Resistor ERJ3GEYJ 473 V (47 kΩ) |
| R23 | 7030003640 | Resistor ERJ3GEYJ 473 V (47 kΩ) |
| R24 | 7030003640 | Resistor ERJ3GEYJ 473 V (47 kΩ) |

[LOGIC UNIT]

| REF. NO. | ORDER NO. | DESCRIPTION |
|----------|------------|--|
| R25 | 7030003640 | Resistor ERJ3GEYJ 473 V (47 kΩ) |
| R26 | 7030003640 | Resistor ERJ3GEYJ 473 V (47 kΩ) |
| R27 | 7030003640 | Resistor ERJ3GEYJ 473 V (47 kΩ) |
| R28 | 7030003640 | Resistor ERJ3GEYJ 473 V (47 kΩ) |
| R29 | 7030003640 | Resistor ERJ3GEYJ 473 V (47 kΩ) |
| R30 | 7030003640 | Resistor ERJ3GEYJ 473 V (47 kΩ) |
| R31 | 7030003640 | Resistor ERJ3GEYJ 473 V (47 kΩ) |
| R32 | 7030003650 | Resistor ERJ3GEYJ 563 V (56 kΩ) |
| R33 | 7030003680 | Resistor ERJ3GEYJ 104 V (100 kΩ) |
| R34 | 7030003680 | Resistor ERJ3GEYJ 104 V (100 kΩ) |
| R35 | 7030003720 | Resistor ERJ3GEYJ 224 V (220 kΩ) |
| R36 | 7030003640 | Resistor ERJ3GEYJ 473 V (47 kΩ) |
| R37 | 7030003640 | Resistor ERJ3GEYJ 473 V (47 kΩ) |
| R38 | 7030003440 | Resistor ERJ3GEYJ 102 V (1 kΩ) |
| R39 | 7030003680 | Resistor ERJ3GEYJ 104 V (100 kΩ) |
| R40 | 7210001870 | Variable Resistor EVU-F2AF20A14 (10KA) |
| R41 | 7210001860 | Variable Resistor EVU-F2AF20B14 (10KB) |
| R43 | 7030003640 | Resistor ERJ3GEYJ 473 V (47 kΩ) |
| R44 | 7030003520 | Resistor ERJ3GEYJ 472 V (4.7 kΩ) |
| R45 | 7030003520 | Resistor ERJ3GEYJ 472 V (4.7 kΩ) |
| R46 | 7030003520 | Resistor ERJ3GEYJ 472 V (4.7 kΩ) |
| R47 | 7030003520 | Resistor ERJ3GEYJ 472 V (4.7 kΩ) |
| R48 | 7030003520 | Resistor ERJ3GEYJ 472 V (4.7 kΩ) |
| R49 | 7030003520 | Resistor ERJ3GEYJ 472 V (4.7 kΩ) |
| R50 | 7030003580 | Resistor ERJ3GEYJ 153 V (15 kΩ) |
| R51 | 7030003520 | Resistor ERJ3GEYJ 472 V (4.7 kΩ) |
| R52 | 7030003800 | Resistor ERJ3GEYJ 105 V (1 MΩ) |
| R53 | 7030003480 | Resistor ERJ3GEYJ 222 V (2.2 kΩ) |
| R54 | 7030003560 | Resistor ERJ3GEYJ 103 V (10 kΩ) |
| R55 | 7030003680 | Resistor ERJ3GEYJ 104 V (2.2 kΩ) |
| R56 | 7030003480 | Resistor ERJ3GEYJ 222 V (2.2 kΩ) |
| R57 | 7030003600 | Resistor ERJ3GEYJ 223 V (22 kΩ) |
| R58 | 7030003560 | Resistor ERJ3GEYJ 103 V (10 kΩ) |
| R59 | 7030003680 | Resistor ERJ3GEYJ 104 V (100 kΩ) |
| R60 | 7030003680 | Resistor ERJ3GEYJ 104 V (100 kΩ) |
| R61 | 7030003680 | Resistor ERJ3GEYJ 104 V (100 kΩ) |
| R62 | 7030003440 | Resistor ERJ3GEYJ 102 V (1 kΩ) |
| R63 | 7030003320 | Resistor ERJ3GEYJ 101 V (100 Ω) |
| R64 | 7030003600 | Resistor ERJ3GEYJ 223 V (22 kΩ) |
| R65 | 7030003840 | Resistor ERJ3GEYJ 225 V (2.2 MΩ) |
| R66 | 7030003840 | Resistor ERJ3GEYJ 225 V (2.2 MΩ) |
| R67 | 7030003680 | Resistor ERJ3GEYJ 104 V (100 kΩ) |
| R68 | 7030003680 | Resistor ERJ3GEYJ 104 V (100 kΩ) |
| R69 | 7030003680 | Resistor ERJ3GEYJ 104 V (100 kΩ) |
| R70 | 7030003680 | Resistor ERJ3GEYJ 104 V (100 kΩ) |
| R71 | 703000140 | Resistor MCR10EZB 10 Ω (100) |
| R72 | 7030003400 | Resistor ERJ3GEYJ 471 V (470 Ω) |
| R73 | 7030003640 | Resistor ERJ3GEYJ 473 V (47 kΩ) |
| R74 | 7030003580 | Resistor ERJ3GEYJ 153 V (15 kΩ) |
| R75 | 7030003350 | Resistor ERJ3GEYJ 181 V (180 Ω) |
| R76 | 7030003350 | Resistor ERJ3GEYJ 181 V (180 Ω) |
| R77 | 7030003640 | Resistor ERJ3GEYJ 473 V (47 kΩ) |
| C1 | 4030006830 | Ceramic C1608 SL 1H 331J-T-A |
| C2 | 4510001320 | Electrolytic 6R3 MS5 47 μF |
| C3 | 4030004760 | Ceramic C2012 JF 1E 104Z-T-A |
| C4 | 4550000270 | Tantalum TESVA 1E 474M1-8L |
| C5 | 4030004760 | Ceramic C2012 JF 1E 104Z-T-A |
| C6 | 4030004760 | Ceramic C2012 JF 1E 104Z-T-A |
| C7 | 4510001320 | Electrolytic 6R3 MS5 47 μF |
| C8 | 4030004760 | Ceramic C2012 JF 1E 104Z-T-A |
| C10 | 4030004760 | Ceramic C2012 JF 1E 104Z-T-A |

[LOGIC UNIT]

| REF. NO. | ORDER NO. | DESCRIPTION | |
|----------|------------|-------------------|-----------------------|
| C11 | 4030006860 | Ceramic | C1608 JB 1H 102K-T-A |
| C12 | 4030006860 | Ceramic | C1608 JB 1H 102K-T-A |
| C13 | 4030006860 | Ceramic | C1608 JB 1H 102K-T-A |
| C14 | 4030006860 | Ceramic | C1608 JB 1H 102K-T-A |
| C15 | 4030006860 | Ceramic | C1608 JB 1H 102K-T-A |
| C16 | 4030006860 | Ceramic | C1608 JB 1H 102K-T-A |
| C17 | 4030006860 | Ceramic | C1608 JB 1H 102K-T-A |
| C18 | 4030004760 | Ceramic | C2012 JF 1E 104Z-T-A |
| C19 | 4030006870 | Ceramic | C1608 JB 1H 222K-T-A |
| C20 | 4030004760 | Ceramic | C2012 JF 1E 104Z-T-A |
| C21 | 4030005090 | Ceramic | C2012 JB 1H 223K-T-A |
| C22 | 4030004760 | Ceramic | C2012 JF 1E 104Z-T-A |
| C23 | 4030006710 | Ceramic | C1608 SL 1H 470J-T-A |
| C24 | 4030006710 | Ceramic | C1608 SL 1H 470J-T-A |
| DS1 | 5030000560 | LCD | LD-BU9496E (E-5141-4) |
| DS2 | 5080000150 | LED | HRS-7219A |
| DS3 | 5080000150 | LED | HRS-7219A |
| S1 | 2250000050 | Switch | EVQ-WQGF15 24B |
| S2 | 2230000550 | Switch | SPPH23079A |
| S3 | 2260000580 | Switch | SKHLAD035A |
| S4 | 2260000580 | Switch | SKHLAD035A |
| S5 | 2260000580 | Switch | SKHLAD035A |
| S6 | 2260000580 | Switch | SKHLAD035A |
| S7 | 2260000580 | Switch | SKHLAD035A |
| S8 | 2260000580 | Switch | SKHLAD035A |
| S9 | 2260000580 | Switch | SKHLAD035A |
| S10 | 2260000580 | Switch | SKHLAD035A |
| S11 | 2260000580 | Switch | SKHLAD035A |
| S12 | 2260000580 | Switch | SKHLAD035A |
| BT1 | 3020000020 | Lithium Battery | BR2032-1T2 |
| EP2 | 8930017730 | LCD contact strip | SRCN-833-W |
| EP1 | 0910025303 | P.C. Board | B 2398C |

[MAIN UNIT]

| REF. NO. | ORDER NO. | DESCRIPTION | |
|----------|------------|-------------|--------------------|
| Q11 | 1590000160 | Transistor | 2SC2712-Y (TE85R) |
| Q12 | 1590000420 | Transistor | RN1404 (TE85R) |
| Q13 | 1590000420 | Transistor | RN1404 (TE85R) |
| Q14 | 1590000420 | Transistor | RN1404 (TE85R) |
| Q15 | 1510000700 | Transistor | 2SA1736 (TE12R) |
| Q16 | 1590001000 | Transistor | RN2427 (TE85R) |
| Q17 | 1530002030 | Transistor | 2SC3772-3-TA |
| Q18 | 1580000360 | FET | 3SK177-T2B U73 |
| Q19 | 1580000360 | FET | 3SK177-T2B U73 |
| Q21 | 1530000160 | Transistor | 2SC2712-Y (TE85R) |
| Q22 | 1520000200 | Transistor | 2SB798-T2 DK |
| Q23 | 1530000160 | Transistor | 2SC2712-Y (TE85R) |
| Q24 | 1590000520 | FET | 2SJ106-GR (TE85R) |
| Q31 | 1590000460 | Transistor | RN1402 (TE85R) |
| Q32 | 1590000980 | Transistor | DTB123EK T147 |
| Q33 | 1530002550 | Transistor | 2SC3326-B (TE85R) |
| Q34 | 1590000690 | Transistor | IMD6 T108 |
| D1 | 1790000450 | Diode | MA862 (TX) |
| D2 | 1790000450 | Diode | MA862 (TX) |
| D3 | 1790000490 | Diode | HSM88AS-TR |
| D4 | 1790000490 | Diode | HSM88AS-TR |
| D5 | 1710000290 | Diode | MI308 (IC-229A/E) |
| | 1710000310 | Diode | MI407 (IC-229H) |
| D6 | 1750000050 | Diode | 1SS193 (TE85R) |
| D7 | 1750000050 | Diode | 1SS193 (TE85R) |
| D8 | 1750000040 | Diode | 1SS190 (TE85R) |
| D9 | 1790000700 | Diode | DSA3A1 |
| D10 | 1750000050 | Diode | 1SS193 (TE85R) |
| D11 | 1790000450 | Diode | MA862 (TX) |
| D12 | 1720000220 | Varicap | 1SV166-T2B |
| D13 | 1720000220 | Varicap | 1SV166-T2B |
| D14 | 1720000220 | Varicap | 1SV166-T2B |
| D15 | 1720000220 | Varicap | 1SV166-T2B |
| D16 | 1790000450 | Diode | MA862 (TX) |
| D17 | 1710000290 | Diode | MI308 |
| D18 | 1710000290 | Diode | MI308 |
| D19 | 1750000020 | Diode | 1SS184 (TE85R) |
| D22 | 1750000010 | Diode | 1SS181 (TE85R) |
| D23 | 1750000020 | Diode | 1SS184 (TE85R) |
| D26 | 1750000070 | Diode | 1SS226 (TE85R) |
| D28 | 1750000040 | Diode | 1SS190 (TE85R) |
| X1 | 6050001990 | Crystal | CR-69 |
| FI1 | 2010000580 | Filter | 17M15B (FL-78) |
| L2 | 6200000770 | Coil | LQN 2A 68NM |
| L3 | 6200000130 | Coil | LQN 2A 47NM |
| L4 | 6180002650 | Coil | RCR-875D-472K |
| L5 | 6200000760 | Coil | LQN 2A 56NM |
| L6 | 6110001540 | Coil | LA-234 |
| L7 | 6170000230 | Coil | LW-25 |
| L8 | 6110001600 | Coil | LA-243 (IC-229A/E) |
| | 6110001540 | Coil | LA-234 (IC-229H) |
| L9 | 6110001550 | Coil | LA-235 (IC-229A/E) |
| | 6110001540 | Coil | LA-234 (IC-229H) |
| L10 | 6170000230 | Coil | LW-25 |
| L11 | 6110001600 | Coil | LA-243 (IC-229A/E) |
| | 6110001540 | Coil | LA-234 (IC-229H) |
| L12 | 6180000900 | Coil | LAL 03NA 101K |
| L13 | 6150003150 | Coil | LS-331 |
| L14 | 6150003150 | Coil | LS-331 |
| L15 | 6150002810 | Coil | LS-291 |

[MAIN UNIT]

| REF. NO. | ORDER NO. | DESCRIPTION | |
|----------|-------------|-------------|-----------------------|
| IC1 | 1150000010 | IC | SC1019 (IC-229A/E) |
| | 1150000760 | IC | SC1091 (IC-229H) |
| IC2 | 1110001270 | IC | BA6161M |
| IC3 | 1110000490 | IC | AN6541 |
| IC4 | 11100002020 | IC | TA7805S |
| IC5 | 1130000830 | IC | μ PD4094BG-T1 |
| IC6 | 1130000830 | IC | μ PD4094BG-T1 |
| IC7 | 1110000890 | IC | μ PC1241H |
| IC8 | 1130004670 | IC | BU4021BF-T1 |
| Q1 | 1590000520 | FET | 2SJ106-GR (TE85R) |
| Q2 | 1590000520 | FET | 2SJ106-GR (TE85R) |
| Q3 | 1590000420 | Transistor | RN1404 (TE85R) |
| Q5 | 1530002030 | Transistor | 2SC3772-3-TA |
| Q6 | 1530002030 | Transistor | 2SC3772-3-TA |
| Q8 | 1530002050 | Transistor | 2SC3661-TA |
| Q9 | 1520000380 | Transistor | 2SB1143 S (IC-229A/E) |
| | 1520000390 | Transistor | 2SB1135 R (IC-229H) |
| Q10 | 152000200 | Transistor | 2SB798-T2 DK |

[MAIN UNIT]

| REF. NO. | ORDER NO. | DESCRIPTION | |
|----------|------------|-------------|--|
| L16 | 6150002810 | Coil | LS-291 |
| L17 | 6150002810 | Coil | LS-291 |
| L18 | 6150002810 | Coil | LS-291 |
| L19 | 6110001550 | Coil | LA-235 |
| L20 | 6110001550 | Coil | LA-235 |
| L24 | 6180001620 | Coil | LAL 02KR R22K |
| R1 | 7030003570 | Resistor | ERJ3GEYJ 123 V (12 kΩ) IC-229A/H (U.S.A) |
| | 7030003630 | Resistor | ERJ3GEYJ 393 V (39 kΩ) IC-229A/E/H (AUS. EUR. ITA SEA) |
| R2 | 7030003570 | Resistor | ERJ3GEYJ 123 V (12 kΩ) |
| R4 | 7030003680 | Resistor | ERJ3GEYJ 104 V (100 kΩ) |
| R5 | 7030003520 | Resistor | ERJ3GEYJ 472 V (4.7 kΩ) IC-229A/H (U.S.A) |
| | 7030003470 | Resistor | ERJ3GEYJ 182 V (1.8 kΩ) IC-229A/E/H (AUR. EUR. ITA. SEA) |
| R6 | 7030003450 | Resistor | ERJ3GEYJ 122 V (1.2 kΩ) IC-229A/H (U.S.A) |
| | 7030003520 | Resistor | ERJ3GEYJ 472 V (4.7 kΩ) IC-229A/E/H (AUR. EUR. ITA. SEA) |
| R7 | 7030003440 | Resistor | ERJ3GEYJ 102 V (1 kΩ) |
| R8 | 703000260 | Resistor | MCR10EZHZ 100 Ω (101) |
| R9 | 7030003710 | Resistor | ERJ3GEYJ 184 V (180 kΩ) |
| R10 | 7030003570 | Resistor | ERJ3GEYJ 123 V (12 kΩ) |
| R11 | 7030003560 | Resistor | ERJ3GEYJ 103 V (10 kΩ) |
| R12 | 4610001230 | Trimmer | EVMLGGA00B14 (103) |
| R18 | 7030003500 | Resistor | ERJ3GEYJ 332 V (3.3 kΩ) |
| R19 | 7030003440 | Resistor | ERJ3GEYJ 102 V (1 kΩ) |
| R20 | 7030003520 | Resistor | ERJ3GEYJ 472 V (4.7 kΩ) |
| R21 | 7030003440 | Resistor | ERJ3GEYJ 102 V (1 kΩ) |
| R22 | 7030001010 | Resistor | MCR50JZHJ 10 Ω (100) |
| R25 | 7030001190 | Resistor | MCR50JZHJ 330 Ω (331) (IC-229A/E) |
| | 7030001170 | Resistor | MCR50JZHJ 220 Ω (221) (IC-229H) |
| R26 | 7030000450 | Resistor | MCR10EZHZ 3.9 kΩ (392) (IC-229A/E ONLY) |
| R27 | 7030003400 | Resistor | ERJ3GEYJ 471 V (470 Ω) (IC-229A/E) |
| | 7030003520 | Resistor | ERJ3GEYJ 472 V (4.7 kΩ) (IC-229H) |
| R28 | 7030000450 | Resistor | MCR10EZHZ 3.9 kΩ (392) (IC-229A/E ONLY) |
| R29 | 7030003400 | Resistor | ERJ3GEYJ 471 V (470 Ω) (IC-229A/E) |
| | 7030003520 | Resistor | ERJ3GEYJ 472 V (4.7 kΩ) (IC-229H) |
| R30 | 7010004720 | Resistor | R50XJ 100 Ω |
| R31 | 7030003680 | Resistor | ERJ3GEYJ 104 V (100 kΩ) |
| R32 | 7030003680 | Resistor | ERJ3GEYJ 104 V (100 kΩ) |
| R33 | 703000260 | Resistor | MCR10EZHZ 100 Ω (101) |
| R34 | 7030003500 | Resistor | ERJ3GEYJ 332 V (3.3 kΩ) |
| R35 | 7030003680 | Resistor | ERJ3GEYJ 104 V (100 kΩ) |
| R36 | 7030000300 | Resistor | MCR10EZHZ 220 Ω (221) |
| R37 | 7030003480 | Resistor | ERJ3GEYJ 222 V (2.2 kΩ) |
| R38 | 7030000260 | Resistor | MCR10EZHZ 100 Ω (101) |
| R39 | 7030003530 | Resistor | ERJ3GEYJ 562 V (5.6 kΩ) |
| R41 | 7030000390 | Resistor | MCR10EZHZ 1.2 kΩ (122) |
| R42 | 7030000390 | Resistor | MCR10EZHZ 1.2 kΩ (122) |
| R43 | 7030000260 | Resistor | MCR10EZHZ 100 Ω (101) |
| R44 | 7030003480 | Resistor | ERJ3GEYJ 222 V (2.2 kΩ) |
| R45 | 7030000420 | Resistor | MCR10EZHZ 2.2 kΩ (222) |
| R46 | 7030003680 | Resistor | ERJ3GEYJ 104 V (100 kΩ) |
| R47 | 4610001040 | Trimmer | EVMLGGA00B54 (503) (IC-229A/E) |
| | 4610001020 | Trimmer | EVMLGGA00B24 (203) (IC-229H) |
| R48 | 7030003560 | Resistor | ERJ3GEYJ 103 V (10 kΩ) (IC-229A/E) |
| | 7030003480 | Resistor | ERJ3GEYJ 222 V (2.2 kΩ) (IC-229H) |

[MAIN UNIT]

| REF. NO. | ORDER NO. | DESCRIPTION | |
|----------|------------|-------------|-------------------------------------|
| R49 | 7030003460 | Resistor | ERJ3GEYJ 152 V (1.5 kΩ) (IC-229A/E) |
| | 7030003440 | Resistor | ERJ3GEYJ 102 V (1 kΩ) (IC-229H) |
| R50 | 7030003520 | Resistor | ERJ3GEYJ 472 V (4.7 kΩ) (IC-229A/E) |
| | 7030003470 | Resistor | ERJ3GEYJ 182 V (1.8 kΩ) (IC-229H) |
| R51 | 7030003570 | Resistor | ERJ3GEYJ 123 V (12 kΩ) (IC-229A/E) |
| | 7030003530 | Resistor | ERJ3GEYJ 562 V (5.6 kΩ) (IC-229H) |
| R52 | 7030003560 | Resistor | ERJ3GEYJ 103 V (10 kΩ) (IC-229A/E) |
| | 7030003500 | Resistor | ERJ3GEYJ 332 V (3.3 kΩ) (IC-229H) |
| R55 | 7030003560 | Resistor | ERJ3GEYJ 103 V (10 kΩ) |
| R56 | 7010004760 | Resistor | R50XJ 270 Ω |
| R59 | 7030003320 | Resistor | ERJ3GEYJ 101 V (100 Ω) |
| R60 | 7030000260 | Resistor | MCR10EZHZ 100 Ω (101) |
| R61 | 7030003400 | Resistor | ERJ3GEYJ 471 V (470 Ω) |
| R62 | 7030003520 | Resistor | ERJ3GEYJ 472 V (4.7 kΩ) |
| R63 | 7030003480 | Resistor | ERJ3GEYJ 222 V (2.2 kΩ) |
| R64 | 7030003480 | Resistor | ERJ3GEYJ 222 V (2.2 kΩ) |
| R65 | 7030000260 | Resistor | MCR10EZHZ 100 Ω (101) |
| R66 | 7030003360 | Resistor | ERJ3GEYJ 221 V (220 Ω) |
| R68 | 7030003500 | Resistor | ERJ3GEYJ 332 V (3.3 kΩ) |
| R69 | 7030003550 | Resistor | ERJ3GEYJ 822 V (8.2 kΩ) |
| R70 | 7030003560 | Resistor | ERJ3GEYJ 103 V (10 kΩ) |
| R71 | 7030003680 | Resistor | ERJ3GEYJ 104 V (100 kΩ) |
| R72 | 7030003680 | Resistor | ERJ3GEYJ 104 V (100 kΩ) |
| R73 | 7030003680 | Resistor | ERJ3GEYJ 104 V (100 kΩ) |
| R74 | 7030000260 | Resistor | MCR10EZHZ 100 Ω (101) |
| R75 | 7030003200 | Resistor | ERJ3GEYJ 100 V (10 Ω) |
| R76 | 7030003310 | Resistor | ERJ3GEYJ 820 V (82 Ω) |
| R77 | 7030003640 | Resistor | ERJ3GEYJ 473 V (47 kΩ) |
| R78 | 7030003600 | Resistor | ERJ3GEYJ 223 V (22 kΩ) |
| R79 | 7030003580 | Resistor | ERJ3GEYJ 153 V (15 kΩ) |
| R80 | 7030003680 | Resistor | ERJ3GEYJ 104 V (100 kΩ) |
| R81 | 7030003500 | Resistor | ERJ3GEYJ 332 V (3.3 kΩ) |
| R83 | 7030003460 | Resistor | ERJ3GEYJ 152 V (1.5 kΩ) |
| R84 | 7030003570 | Resistor | ERJ3GEYJ 123 V (12 kΩ) |
| R90 | 7030003560 | Resistor | ERJ3GEYJ 563 V (56 kΩ) |
| R91 | 7030003200 | Resistor | ERJ3GEYJ 100 V (10 Ω) |
| R92 | 7030003610 | Resistor | ERJ3GEYJ 273 V (27 kΩ) |
| R93 | 7030003740 | Resistor | ERJ3GEYJ 334 V (330 kΩ) |
| R94 | 7030003480 | Resistor | ERJ3GEYJ 222 V (2.2 kΩ) |
| R95 | 7030003360 | Resistor | ERJ3GEYJ 221 V (220 Ω) |
| R96 | 7030003470 | Resistor | ERJ3GEYJ 182 V (1.8 kΩ) |
| R97 | 7030003450 | Resistor | ERJ3GEYJ 122 V (1.2 kΩ) |
| R98 | 7030001170 | Resistor | MCR50JZHJ 220 Ω (221) |
| R99 | 7030003610 | Resistor | ERJ3GEYJ 273 V (27 kΩ) |
| R100 | 7030003610 | Resistor | ERJ3GEYJ 273 V (27 kΩ) |
| R101 | 7030003650 | Resistor | ERJ3GEYJ 563 V (56 kΩ) |
| R102 | 7030003520 | Resistor | ERJ3GEYJ 472 V (4.7 kΩ) |
| R104 | 7030003600 | Resistor | ERJ3GEYJ 223 V (22 kΩ) |
| R105 | 7030000380 | Resistor | MCR10EZHZ 1 kΩ (102) |
| R106 | 7030000080 | Resistor | MCR10EZHZ 3.3 Ω (3R3) |
| R107 | 7030000060 | Resistor | MCR10EZHZ 2.2 Ω (2R2) |
| R108 | 7030003680 | Resistor | ERJ3GEYJ 104 V (100 kΩ) |
| R109 | 7030003680 | Resistor | ERJ3GEYJ 104 V (100 kΩ) |
| R110 | 7030003680 | Resistor | ERJ3GEYJ 104 V (100 kΩ) |
| R111 | 7030003680 | Resistor | ERJ3GEYJ 104 V (100 kΩ) |
| R112 | 7030003680 | Resistor | ERJ3GEYJ 104 V (100 kΩ) |
| R113 | 7030003680 | Resistor | ERJ3GEYJ 104 V (100 kΩ) |
| R114 | 7030003680 | Resistor | ERJ3GEYJ 104 V (100 kΩ) |
| R115 | 7030003680 | Resistor | ERJ3GEYJ 104 V (100 kΩ) |
| R116 | 7030003650 | Resistor | ERJ3GEYJ 563 V (56 kΩ) |

[MAIN UNIT]

| REF. NO. | ORDER NO. | DESCRIPTION |
|----------|------------|--|
| R117 | 7030003320 | Resistor ERJ3GEYJ 101 V (100 Ω) |
| R118 | 7030003300 | Resistor ERJ3GEYJ 680 V (68 Ω) |
| R119 | 7030003320 | Resistor ERJ3GEYJ 101 V (100 Ω) |
| R120 | 7030003350 | Resistor ERJ3GEYJ 181 V (180 Ω) |
| R121 | 7030003350 | Resistor ERJ3GEYJ 181 V (180 Ω) |
| R124 | 7030003600 | Resistor ERJ3GEYJ 223 V (22 kΩ) |
| R125 | 7030003560 | Resistor ERJ3GEYJ 103 V (10 kΩ) |
| R128 | 7030003370 | Resistor ERJ3GEYJ 271 V (270 Ω) |
| R129 | 7030003230 | Resistor ERJ3GEYJ 180 V (18 Ω) |
| R130 | 7030003370 | Resistor ERJ3GEYJ 271 V (270 Ω) |
| R131 | 7030003440 | Resistor ERJ3GEYJ 102 V (1.0 kΩ) |
| R132 | 7030003560 | Resistor ERJ3GEYJ 103 V (10 kΩ) |
| R133 | 7030003560 | Resistor ERJ3GEYJ 103 V (10 kΩ) |
| R134 | 7030000300 | Resistor MCR10EZHJ 220 Ω (221) |
| R135 | 7520000030 | Posistor PTH59F04BG222TS |
| C1 | 4550000530 | Tantalum TESVA 1V 104M1-8L |
| C2 | 4030006860 | Ceramic C1608 JB 1H 102K-T-A |
| C3 | 4030006860 | Ceramic C1608 JB 1H 102K-T-A |
| C4 | 4030004760 | Ceramic C2012 JF 1E 104Z-T-A |
| C5 | 4030008600 | Ceramic GRM42-6 F 105Z 16 PT |
| C6 | 4030006860 | Ceramic C1608 JB 1H 102K-T-A |
| C7 | 4030006890 | Ceramic C1608 JF 1H 103Z-T-A |
| C8 | 4030008600 | Ceramic GRM42-6 F 105Z 16 PT |
| C13 | 4030006610 | Ceramic C1608 SL 1H 100D-T-A |
| C14 | 4030006660 | Ceramic C1608 SL 1H 220J-T-A |
| C15 | 4030006620 | Ceramic C1608 SL 1H 120J-T-A |
| C16 | 4030006660 | Ceramic C1608 SL 1H 220J-T-A |
| C17 | 4020000620 | Cylinder UP050 SL 220J |
| C18 | 4030006660 | Ceramic C1608 SL 1H 220J-T-A |
| C19 | 4030006660 | Ceramic C1608 SL 1H 220J-T-A |
| C20 | 4550000450 | Tantalum TESVC 1C 106M-12L |
| C22 | 4550000450 | Tantalum TESVC 1C 106M-12L |
| C23 | 4030006860 | Ceramic C1608 JB 1H 102K-T-A |
| C24 | 4010003930 | Ceramic DD06 SL 270K 500V (IC-229A/E) |
| | 4010003950 | Ceramic DD06 SL 330K 500V (IC-229H) |
| C25 | 4010003930 | Ceramic DD06 SL 270K 500V (IC-229A/E) |
| | 4010003950 | Ceramic DD06 SL 330K 500V (IC-229H) |
| C26 | 4010004120 | Ceramic DD07 B 102K 500V |
| C27 | 4030006860 | Ceramic C1608 JB 1H 102K-T-A |
| C28 | 4010004120 | Ceramic DD07 B 102K 500V |
| C29 | 4010003880 | Ceramic DD06 SL 150K 500V (IC-229A/E) |
| | 4010003910 | Ceramic DD06 SL 220K 500V (IC-229H) |
| C30 | 4010003940 | Ceramic DD06 SL 300K 500V (IC-229A/E) |
| | 4010003960 | Ceramic DD06 SL 390K 500V (IC-229H) |
| C31 | 4010003940 | Ceramic DD06 SL 300K 500V (IC-229A/E) |
| | 4010003960 | Ceramic DD06 SL 390K 500V (IC-229H) |
| C32 | 4010003880 | Ceramic DD06 SL 150K 500V (IC-229A/E) |
| | 4010003910 | Ceramic DD06 SL 220K 500V (IC-229H) |
| C33 | 4030006860 | Ceramic C1608 JB 1H 102K-T-A |
| C34 | 4030007050 | Ceramic C1608 CH 1H 220J-T-A |
| C35 | 4610000920 | Trimmer ECRGA010A30 |
| C36 | 4030007050 | Ceramic C1608 CH 1H 220J-T-A |
| C37 | 4030004980 | Ceramic C2012 CH 1H 820J-T-A |
| C38 | 4030007090 | Ceramic C1608 CH 1H 470J-T-A |

[MAIN UNIT]

| REF. NO. | ORDER NO. | DESCRIPTION |
|----------|------------|------------------------------|
| C39 | 4030006890 | Ceramic C1608 JF 1H 103Z-T-A |
| C40 | 4030006860 | Ceramic C1608 JB 1H 102K-T-A |
| C41 | 4030006520 | Ceramic C1608 SL 1H 010C-T-A |
| C42 | 4030006890 | Ceramic C1608 JF 1H 103Z-T-A |
| C43 | 4030006860 | Ceramic C1608 JB 1H 102K-T-A |
| C45 | 4020000100 | Cylinder UP125 SL 220J |
| C47 | 4030006860 | Ceramic C1608 JB 1H 102K-T-A |
| C48 | 4030006890 | Ceramic C1608 JF 1H 103Z-T-A |
| C49 | 4510002710 | Electrolytic 10 SS 33 μF |
| C50 | 4030006860 | Ceramic C1608 JB 1H 102K-T-A |
| C51 | 4030008600 | Ceramic GRM42-6 F 105Z 16 PT |
| C52 | 4510003150 | Electrolytic 35 SS 33 μF |
| C53 | 4510002970 | Electrolytic 50 SS 4R7 μF |
| C54 | 4510003150 | Electrolytic 35 SS 33 μF |
| C55 | 4030008600 | Ceramic GRM42-6 F 105Z 16 PT |
| C56 | 4030006860 | Ceramic C1608 JB 1H 102K-T-A |
| C57 | 4030006860 | Ceramic C1608 JB 1H 102K-T-A |
| C58 | 4510002640 | Electrolytic 25 SS 47 μF |
| C59 | 4510002640 | Electrolytic 25 SS 47 μF |
| C60 | 4030006860 | Ceramic C1608 JB 1H 102K-T-A |
| C61 | 4510002640 | Electrolytic 25 SS 47 μF |
| C62 | 4510002640 | Electrolytic 25 SS 47 μF |
| C63 | 4510002820 | Electrolytic 16 SS 1000 μF |
| C64 | 4030006860 | Ceramic C1608 JB 1H 102K-T-A |
| C65 | 4030006860 | Ceramic C1608 JB 1H 102K-T-A |
| C66 | 4030006860 | Ceramic C1608 JB 1H 102K-T-A |
| C67 | 4030006860 | Ceramic C1608 JB 1H 102K-T-A |
| C68 | 4030006880 | Ceramic C1608 JB 1H 472K-T-A |
| C69 | 4030006660 | Ceramic C1608 SL 1H 220J-T-A |
| C70 | 4030006730 | Ceramic C1608 SL 1H 680J-T-A |
| C71 | 4030006540 | Ceramic C1608 SL 1H 030C-T-A |
| C72 | 4030006740 | Ceramic C1608 SL 1H 820J-T-A |
| C73 | 4030006730 | Ceramic C1608 SL 1H 680J-T-A |
| C74 | 4030006860 | Ceramic C1608 JB 1H 102K-T-A |
| C75 | 4030006860 | Ceramic C1608 JB 1H 102K-T-A |
| C76 | 4030006580 | Ceramic C1608 SL 1H 070D-T-A |
| C77 | 4030006850 | Ceramic C1608 JB 1H 471K-T-A |
| C78 | 4030006860 | Ceramic C1608 JB 1H 102K-T-A |
| C80 | 4030006570 | Ceramic C1608 SL 1H 060D-T-A |
| C81 | 4030006590 | Ceramic C1608 SL 1H 080D-T-A |
| C82 | 4030006520 | Ceramic C1608 SL 1H 010C-T-A |
| C83 | 4030006510 | Ceramic C1608 SL 1H 0R5C-T-A |
| C84 | 4030006610 | Ceramic C1608 SL 1H 100D-T-A |
| C85 | 4030006520 | Ceramic C1608 SL 1H 010C-T-A |
| C86 | 4030006510 | Ceramic C1608 SL 1H 0R5C-T-A |
| C87 | 4030006610 | Ceramic C1608 SL 1H 100D-T-A |
| C88 | 4030006520 | Ceramic C1608 SL 1H 010C-T-A |
| C89 | 4030006860 | Ceramic C1608 JB 1H 102K-T-A |
| C90 | 4030006860 | Ceramic C1608 JB 1H 102K-T-A |
| C91 | 4030006860 | Ceramic C1608 JB 1H 102K-T-A |
| C92 | 4030006860 | Ceramic C1608 JB 1H 102K-T-A |
| C93 | 4030006730 | Ceramic C1608 SL 1H 680J-T-A |
| C94 | 4030006660 | Ceramic C1608 SL 1H 220J-T-A |
| C95 | 4030006510 | Ceramic C1608 SL 1H 0R5C-T-A |
| C96 | 4030006580 | Ceramic C1608 SL 1H 070D-T-A |
| C97 | 4030006750 | Ceramic C1608 SL 1H 101J-T-A |
| C98 | 4030006660 | Ceramic C1608 SL 1H 220J-T-A |
| C99 | 4030006700 | Ceramic C1608 SL 1H 390J-T-A |
| C100 | 4030006860 | Ceramic C1608 JB 1H 102K-T-A |
| C101 | 4010003890 | Ceramic DD06 SL 180K 500V |
| C102 | 4510002970 | Electrolytic 50 SS 4R7 μF |
| C103 | 4550002980 | Tantalum TEMSVA 1C 225M-8L |
| C104 | 4030004760 | Ceramic C2012 JF 1E 104Z-T-A |
| C105 | 4030004760 | Ceramic C2012 JF 1E 104Z-T-A |
| C106 | 4030006480 | Ceramic GRM42-6 B 104K 50 PT |
| C107 | 4030008600 | Ceramic GRM42-6 F 105Z 16 PT |
| C108 | 4030006860 | Ceramic C1608 JB 1H 102K-T-A |
| C109 | 4030006860 | Ceramic C1608 JB 1H 102K-T-A |

[MAIN UNIT]

| REF. NO. | ORDER NO. | DESCRIPTION | |
|----------|------------|--------------|--|
| C112 | 4030006860 | Ceramic | C1608 JB 1H 102K-T-A |
| C113 | 4030006860 | Ceramic | GRM42-6 F 105Z 16 PT |
| C114 | 4030006860 | Ceramic | C1608 JB 1H 102K-T-A |
| C115 | 4030006860 | Ceramic | GRM42-6 F 105Z 16 PT |
| C116 | 4030006860 | Ceramic | C1608 JB 1H 102K-T-A |
| C117 | 4030006860 | Ceramic | GRM42-6 F 105Z 16 PT |
| C125 | 4550000270 | Tantalum | TESVA 1E 474M1-8L |
| C126 | 4030006850 | Ceramic | C1608 JB 1H 471K-T-A |
| C127 | 4510002640 | Electrolytic | 25 SS 47 μ F |
| C128 | 4510002440 | Electrolytic | 16 SS 220 μ F (8X11) |
| C129 | 4510002640 | Electrolytic | 25 SS 47 μ F |
| C130 | 4510002440 | Electrolytic | 16 SS 220 μ F (8X11) |
| C131 | 4030008760 | Ceramic | C2012 X7R 1C 104K-T-A |
| C132 | 4030004760 | Ceramic | C2012 JF 1E 104Z-T-A |
| C133 | 4030006890 | Ceramic | C1608 JF 1H 103Z-T-A |
| C134 | 4030006860 | Ceramic | C1608 JB 1H 102K-T-A |
| C135 | 4030008600 | Ceramic | GRM42-6 F 105Z 16 PT |
| C136 | 4030006860 | Ceramic | C1608 JB 1H 102K-T-A |
| C137 | 4030006860 | Ceramic | C1608 JB 1H 102K-T-A |
| C138 | 4550000450 | Tantalum | TESVC 1C 106M-12L |
| C139 | 4030006860 | Ceramic | C1608 JB 1H 102K-T-A |
| C140 | 4030006710 | Ceramic | C1608 SL 1H 470J-T-A |
| C141 | 4030006710 | Ceramic | C1608 SL 1H 470J-T-A |
| C142 | 4030008600 | Ceramic | GRM42-6 F 105Z 16 PT |
| C148 | 4030008600 | Ceramic | GRM42-6 F 105Z 16 PT |
| C149 | 4030006860 | Ceramic | C1608 JB 1H 102K-T-A |
| C150 | 4030006860 | Ceramic | C1608 JB 1H 102K-T-A |
| C151 | 4030006860 | Ceramic | C1608 JB 1H 102K-T-A |
| C152 | 4030006860 | Ceramic | C1608 JB 1H 102K-T-A |
| C153 | 4030006860 | Ceramic | C1608 JB 1H 102K-T-A |
| C154 | 4030006860 | Ceramic | C1608 JB 1H 102K-T-A |
| C155 | 4030006860 | Ceramic | C1608 JB 1H 102K-T-A |
| C156 | 4030006860 | Ceramic | C1608 JB 1H 102K-T-A |
| C159 | 4030006860 | Ceramic | C1608 JB 1H 102K-T-A |
| C160 | 4030006860 | Ceramic | C1608 JB 1H 102K-T-A |
| C161 | 4030006860 | Ceramic | C1608 JB 1H 102K-T-A |
| C163 | 4030006860 | Ceramic | C1608 JB 1H 102K-T-A |
| C165 | 4030006850 | Ceramic | C1608 JB 1H 471K-T-A |
| C166 | 4030006860 | Ceramic | C1608 JB 1H 102K-T-A |
| C167 | 4030006860 | Ceramic | C1608 JB 1H 102K-T-A |
| C168 | 4030006860 | Ceramic | C1608 JB 1H 102K-T-A |
| C169 | 4030006860 | Ceramic | C1608 JB 1H 102K-T-A |
| C170 | 4030006860 | Ceramic | C1608 JB 1H 102K-T-A |
| C171 | 4030006860 | Ceramic | C1608 JB 1H 102K-T-A |
| C173 | 4030006850 | Ceramic | C1608 JB 1H 471K-T-A |
| C175 | 4030006860 | Ceramic | C1608 JB 1H 102K-T-A |
| C176 | 4030006860 | Ceramic | C1608 JB 1H 102K-T-A |
| C178 | 4030006860 | Ceramic | C1608 JB 1H 102K-T-A |
| C179 | 4030006860 | Ceramic | C1608 JB 1H 102K-T-A |
| C180 | 4030006710 | Ceramic | C1608 SL 1H 470J-T-A |
| C181 | 4030006710 | Ceramic | C1608 SL 1H 470J-T-A |
| C182 | 4030006710 | Ceramic | C1608 SL 1H 470J-T-A |
| C183 | 4030004760 | Ceramic | C2012 JF 1E 104Z-T-A |
| C184 | 4030006860 | Ceramic | C1608 JB 1H 102K-T-A |
| C185 | 4510002870 | Electrolytic | 25 SS 100 μ F (IC-229A/E) |
| | 4030004800 | Ceramic | C2012 CH 1H 030C-T-A (IC-229H) |
| C186 | 4030004800 | Ceramic | C2012 CH 1H 030C-T-A (IC-229H ONLY) |
| C187 | 4030007050 | Ceramic | C1608 CH 1H 220J-T-A (IC-229H ONLY) |
| C188 | 4030007050 | Ceramic | C1608 CH 1H 220J-T-A (IC-229H ONLY) |
| EP1 | 0910028490 | P.C. Board | B 2895 |

[PLL UNIT]

| REF. NO. | ORDER NO. | DESCRIPTION | |
|----------|------------|--------------|-------------------------------|
| IC1 | 1130003650 | IC | PLL2001S |
| Q1 | 1560000360 | FET | 2SK209-Y (TE85R) |
| Q2 | 1560000360 | FET | 2SK209-Y (TE85R) |
| Q3 | 1530000160 | Transistor | 2SC2712-Y (TE85R) |
| Q4 | 1510000110 | Transistor | 2SA1162-Y (TE85R) |
| Q5 | 1530002490 | Transistor | 2SC3324-GR (TE85R) |
| Q6 | 1510000760 | Transistor | 2SA1312-BL (TE85L) |
| Q7 | 1530002490 | Transistor | 2SC3324-GR (TE85R) |
| Q8 | 1510000110 | Transistor | 2SA1162-Y (TE85R) |
| D1 | 1750000050 | Diode | 1SS193 (TE85R) |
| L1 | 6180001300 | Coll | LAL 02NA 100K |
| R1 | 7030000420 | Resistor | MCR10EZJ 2.2 k Ω (222) |
| R2 | 7030000310 | Resistor | MCR10EZJ 270 Ω (271) |
| R3 | 7030000500 | Resistor | MCR10EZJ 10 k Ω (103) |
| R4 | 7030000970 | Resistor | MCR10EZJ 2.2 M Ω (225) |
| R5 | 7030000620 | Resistor | MCR10EZJ 100 k Ω (104) |
| R6 | 7030000640 | Resistor | MCR10EZJ 150 k Ω (154) |
| R7 | 7030000670 | Resistor | MCR10EZJ 270 k Ω (274) |
| R8 | 7030000380 | Resistor | MCR10EZJ 1 k Ω (102) |
| R9 | 7030000620 | Resistor | MCR10EZJ 100 k Ω (104) |
| R10 | 7030000580 | Resistor | MCR10EZJ 47 k Ω (473) |
| R11 | 7030000660 | Resistor | MCR10EZJ 220 k Ω (224) |
| R12 | 7030000580 | Resistor | MCR10EZJ 47 k Ω (473) |
| R13 | 7030000590 | Resistor | MCR10EZJ 56 k Ω (563) |
| R14 | 7030000660 | Resistor | MCR10EZJ 220 k Ω (224) |
| R15 | 7030000460 | Resistor | MCR10EZJ 4.7 k Ω (472) |
| R16 | 7030000670 | Resistor | MCR10EZJ 270 k Ω (274) |
| R17 | 7030000620 | Resistor | MCR10EZJ 100 k Ω (104) |
| R18 | 7030000520 | Resistor | MCR10EZJ 15 k Ω (153) |
| R19 | 7030000670 | Resistor | MCR10EZJ 270 k Ω (274) |
| R20 | 7030000660 | Resistor | MCR10EZJ 220 k Ω (224) |
| C1 | 4550000260 | Tantalum | DN 1V 100M |
| C2 | 4550000260 | Tantalum | DN 1V 100M |
| C3 | 4550003280 | Tantalum | TEMSVB 1V 225M-12 L |
| C4 | 4550000530 | Tantalum | TESVA 1V 104M1-8L |
| C5 | 4510001850 | Electrolytic | 16 MS5 4R7 μ F |
| C6 | 4510001470 | Electrolytic | 50 MS5 1 μ F |
| C7 | 4030004710 | Ceramic | C2012 JB 1H 471K-T-A |
| C8 | 4030004760 | Ceramic | C2012 JF 1E 104Z-T-A |
| C9 | 4510001470 | Electrolytic | 50 MS5 1 μ F |
| C10 | 4030006450 | Ceramic | C2012 JF 1H 103Z-T-A |
| C11 | 4030004720 | Ceramic | C2012 JB 1H 102K-T-A |
| C13 | 4030004720 | Ceramic | C2012 JB 1H 102K-T-A |
| EP1 | 0910027080 | P.C. Board | B 2737 |

[VCO UNIT]

| REF. NO. | ORDER NO. | DESCRIPTION | |
|----------|------------|-------------|--------------|
| Q1 | 1560000130 | FET | 2SK125 |
| Q2 | 1530002030 | Transistor | 2SC3772-3-TA |
| Q3 | 1530002030 | Transistor | 2SC3772-3-TA |
| Q4 | 1530002030 | Transistor | 2SC3772-3-TA |
| D1 | 1720000060 | Varicap | 1SV50 (1) E |

[VCO UNIT]

| REF. NO. | ORDER NO. | DESCRIPTION | |
|----------|------------|--------------|------------------------|
| D2 | 1720000060 | Varicap | 1SV50 (1) E |
| L1 | 6200000480 | Coil | MLF3216A 3R3M-T |
| L2 | 6200000480 | Coil | MLF3216A 3R3M-T |
| L3 | 6130002350 | Coil | LB-259 |
| L4 | 6180001940 | Coil | LAL 02NA 3R3K |
| L5 | 6110001650 | Coil | LA-248 |
| L6 | 6110001650 | Coil | LA-248 |
| R1 | 7030000380 | Resistor | MCR10EZHJ 1 kΩ (102) |
| R2 | 7030000180 | Resistor | MCR10EZHJ 22 Ω (220) |
| R3 | 7030000180 | Resistor | MCR10EZHJ 22 Ω (220) |
| R4 | 7030000520 | Resistor | MCR10EZHJ 15 kΩ (153) |
| R5 | 7030000340 | Resistor | MCR10EZHJ 470 Ω (471) |
| R6 | 7030000260 | Resistor | MCR10EZHJ 100 Ω (101) |
| R7 | 7030000460 | Resistor | MCR10EZHJ 4.7 kΩ (472) |
| R8 | 7030000360 | Resistor | MCR10EZHJ 680 Ω (681) |
| R9 | 7030000220 | Resistor | MCR10EZHJ 47 Ω (470) |
| R10 | 7030000160 | Resistor | MCR10EZHJ 15 Ω (150) |
| R11 | 7030000160 | Resistor | MCR10EZHJ 15 Ω (150) |
| R12 | 7030000160 | Resistor | MCR10EZHJ 15 Ω (150) |
| R13 | 7030000260 | Resistor | MCR10EZHJ 100 Ω (101) |
| R14 | 7030000460 | Resistor | MCR10EZHJ 4.7 kΩ (472) |
| R15 | 7030000360 | Resistor | MCR10EZHJ 680 Ω (681) |
| R16 | 7030000260 | Resistor | MCR10EZHJ 100 Ω (101) |
| R17 | 7030000460 | Resistor | MCR10EZHJ 4.7 kΩ (472) |
| R18 | 7030000360 | Resistor | MCR10EZHJ 680 Ω (681) |
| R19 | 7030000300 | Resistor | MCR10EZHJ 220 Ω (221) |
| C1 | 4030004720 | Ceramic | C2012 JB 1H 102K-T-A |
| C2 | 4510001850 | Electrolytic | 16 MS5 4R7 μF |
| C3 | 4030004720 | Ceramic | C2012 JB 1H 102K-T-A |
| C4 | 4030004720 | Ceramic | C2012 JB 1H 102K-T-A |
| C5 | 4030004720 | Ceramic | C2012 JB 1H 102K-T-A |
| C6 | 4030004710 | Ceramic | C2012 JB 1H 471K-T-A |
| C7 | 4030004380 | Ceramic | C2012 SL 1H 010C-T-A |
| C8 | 4030004710 | Ceramic | C2012 JB 1H 471K-T-A |
| C9 | 4030004720 | Ceramic | C2012 JB 1H 102K-T-A |
| C10 | 4030004610 | Ceramic | C2012 SL 1H 101J-T-A |
| C11 | 4030004720 | Ceramic | C2012 JB 1H 102K-T-A |
| C12 | 4030004720 | Ceramic | C2012 JB 1H 102K-T-A |
| C13 | 4030004710 | Ceramic | C2012 JB 1H 471K-T-A |
| C14 | 4030004710 | Ceramic | C2012 JB 1H 471K-T-A |
| C15 | 4010000120 | Ceramic | DD104 SL 100D 50V |
| C16 | 4010000460 | Ceramic | DD104 B 471K 50V |
| C18 | 4030004720 | Ceramic | C2012 JB 1H 102K-T-A |
| C19 | 4030004720 | Ceramic | C2012 JB 1H 102K-T-A |
| EP1 | 0910025182 | P.C. Board | B 2451B |

[APC UNIT]

| REF. NO. | ORDER NO. | DESCRIPTION | |
|----------|------------|--------------|--|
| R5 | 7030000500 | Resistor | MCR10EZHJ 10 kΩ (103) |
| R6 | 7030000660 | Resistor | MCR10EZHJ 220 kΩ (224) (IC-229A/E) |
| | 7030000610 | Resistor | MCR10EZHJ 82 kΩ (823) (IC-229H) |
| R7 | 7030000510 | Resistor | MCR10EZHJ 12 kΩ (123) |
| R8 | 7030000460 | Resistor | MCR10EZHJ 4.7 kΩ (472) |
| R9 | 7030000460 | Resistor | MCR10EZHJ 4.7 kΩ (472) |
| R10 | 7030000540 | Resistor | MCR10EZHJ 22 kΩ (223) |
| R11 | 7030000730 | Resistor | MCR10EZHJ 820 kΩ (824) |
| R13 | 703000060 | Resistor | MCR10EZHJ 2.2 Ω (2R2) |
| C1 | 4030004710 | Ceramic | C2012 JB 1H 471K-T-A (IC-229A/E ONLY) |
| C2 | 4030004720 | Ceramic | C2012 JB 1H 102K-T-A |
| C3 | 4550000380 | Tantalum | DN 1A 100M (IC-229A/E) |
| | 4510001820 | Electrolytic | 10 MS5 10 μF (IC-229H) |
| C4 | 4510001820 | Electrolytic | 10 MS5 10 μF |
| C5 | 4030004720 | Ceramic | C2012 JB 1H 102K-T-A |
| C6 | 4030004720 | Ceramic | C2012 JB 1H 102K-T-A |
| C7 | 4030008680 | Ceramic | C2012 JF 1C 105Z-T-A |
| EP1 | 0910027150 | P.C. Board | B 2403 |

[MIC-AMP UNIT]

| REF. NO. | ORDER NO. | DESCRIPTION | |
|----------|------------|-------------|-------------------------|
| IC1 | 1110000960 | IC | NJM4558M (T1) |
| Q1 | 1530002690 | Transistor | 2SC4116-GR (TE85R) |
| R1 | 7030003680 | Resistor | ERJ3GEYJ 104 V (100 kΩ) |
| R2 | 7030003600 | Resistor | ERJ3GEYJ 223 V (22 kΩ) |
| R3 | 7030003280 | Resistor | ERJ3GEYJ 470 V (47 Ω) |
| R4 | 7030003420 | Resistor | ERJ3GEYJ 681 V (680 Ω) |
| R5 | 7030003390 | Resistor | ERJ3GEYJ 391 V (390 Ω) |
| R6 | 7030003740 | Resistor | ERJ3GEYJ 334 V (330 kΩ) |
| R7 | 7030003750 | Resistor | ERJ3GEYJ 394 V (390 kΩ) |
| R8 | 7030003790 | Resistor | ERJ3GEYJ 824 V (820 kΩ) |
| R9 | 7030003710 | Resistor | ERJ3GEYJ 184 V (180 kΩ) |
| R10 | 7030003580 | Resistor | ERJ3GEYJ 153 V (15 kΩ) |
| R11 | 7030003720 | Resistor | ERJ3GEYJ 224 V (220 kΩ) |
| R12 | 7030003670 | Resistor | ERJ3GEYJ 823 V (82 kΩ) |
| R13 | 7030003670 | Resistor | ERJ3GEYJ 823 V (82 kΩ) |
| R14 | 7030003670 | Resistor | ERJ3GEYJ 823 V (82 kΩ) |
| R15 | 703000320 | Resistor | ERJ3GEYJ 101 V (100 Ω) |
| C1 | 4030001150 | Ceramic | GRM40 F 104Z 25PT |
| C2 | 4030006860 | Ceramic | C1608 JB 1H 102K-T-A |
| C3 | 4030008660 | Ceramic | C2012 JB 1H 333K-T-A |
| C4 | 4550000460 | Tantalum | TESVA 1C 105M1-8L |
| C5 | 4030007020 | Ceramic | C1608 CH 1H 120J-T-A |
| C6 | 4030001150 | Ceramic | GRM40 F 104Z 25PT |
| C7 | 4030008690 | Ceramic | C2012 SL 1H 821J-T-A |
| C8 | 4030006860 | Ceramic | C1608 JB 1H 102K-T-A |
| C9 | 4030006740 | Ceramic | C1608 SL 1H 820J-T-A |
| C10 | 4030008650 | Ceramic | C1608 JB 1H 332K-T-A |
| C11 | 4030006750 | Ceramic | C1608 SL 1H 101J-T-A |
| C12 | 4550000660 | Tantalum | TESVA OG 335M1-8L |
| EP1 | 0910027122 | P.C. Board | B 2377B |

[APC UNIT]

| REF. NO. | ORDER NO. | DESCRIPTION | |
|----------|------------|-------------|------------------------|
| IC1 | 111001240 | IC | μ PC358G2-T1 |
| Q1 | 153000160 | Transistor | 2SC2712-Y (TE85R) |
| R1 | 7030000580 | Resistor | MCR10EZHJ 47 kΩ (473) |
| R2 | 7030000580 | Resistor | MCR10EZHJ 47 kΩ (473) |
| R3 | 7030000440 | Resistor | MCR10EZHJ 3.3 kΩ (332) |
| R4 | 7030000460 | Resistor | MCR10EZHJ 4.7 kΩ (472) |

[YGR UNIT]

| REF. NO. | ORDER NO. | DESCRIPTION | |
|----------|------------|-------------|-------------------------|
| Q1 | 1530002240 | Transistor | 2SC3775-3-TA |
| Q2 | 1530002340 | Transistor | 2SC2954-T2B |
| D1 | 1750000070 | Diode | 1SS226 (TE85R) |
| D2 | 1750000050 | Diode | 1SS193 (TE85R) |
| L1 | 6200000210 | Coil | NL 322522T-039M |
| L2 | 6200001020 | Coil | NL 322522T-082M |
| L3 | 6200000200 | Coil | NL 322522T-033M |
| L4 | 6200001010 | Coil | NL 322522T-068M |
| R1 | 7030003520 | Resistor | ERJ3GEYJ 472 V (4.7 kΩ) |
| R2 | 7030003450 | Resistor | ERJ3GEYJ 122 V (1.2 kΩ) |
| R3 | 7030003320 | Resistor | ERJ3GEYJ 101 V (100 Ω) |
| R4 | 7030003440 | Resistor | ERJ3GEYJ 102 V (1 kΩ) |
| R5 | 7030003430 | Resistor | ERJ3GEYJ 821 V (820 Ω) |
| R6 | 7030003440 | Resistor | ERJ3GEYJ 102 V (1 kΩ) |
| C1 | 4030006660 | Ceramic | C1608 SL 1H 220J-T-A |
| C2 | 4030006540 | Ceramic | C1608 SL 1H 030C-T-A |
| C3 | 4030006860 | Ceramic | C1608 JB 1H 102K-T-A |
| C4 | 4030006850 | Ceramic | C1608 JB 1H 471K-T-A |
| C5 | 4030006610 | Ceramic | C1608 SL 1H 100D-T-A |
| C6 | 4030006680 | Ceramic | C1608 SL 1H 300J-T-A |
| C7 | 4030006850 | Ceramic | C1608 JB 1H 471K-T-A |
| C8 | 4030006850 | Ceramic | C1608 JB 1H 471K-T-A |
| C9 | 4030006860 | Ceramic | C1608 JB 1H 102K-T-A |
| C10 | 4030006850 | Ceramic | C1608 JB 1H 471K-T-A |
| C11 | 4030006710 | Ceramic | C1608 SL 1H 470J-T-A |
| C12 | 4030006660 | Ceramic | C1608 SL 1H 220J-T-A |
| EP1 | 0910024841 | P.C. Board | B 2371A |

[IF UNIT]

| REF. NO. | ORDER NO. | DESCRIPTION | |
|----------|------------|--------------|-------------------------|
| R5 | 7030003640 | Resistor | ERJ3GEYJ 473 V (47 kΩ) |
| R6 | 7030003400 | Resistor | ERJ3GEYJ 471 V (470 Ω) |
| R7 | 7030003440 | Resistor | ERJ3GEYJ 102 V (1.0 kΩ) |
| R8 | 7030003480 | Resistor | ERJ3GEYJ 222 V (2.2 kΩ) |
| R10 | 7030003470 | Resistor | ERSM30J 182 V (1.8 kΩ) |
| R13 | 7030003730 | Resistor | ERJ3GEYJ 274 V (270 kΩ) |
| R14 | 7030003520 | Resistor | ERJ3GEYJ 472 V (4.7 kΩ) |
| R15 | 7030003630 | Resistor | ERJ3GEYJ 393 V (39 kΩ) |
| R16 | 7030003710 | Resistor | ERJ3GEYJ 184 V (180 kΩ) |
| R17 | 703000260 | Resistor | MCR10EZHJ 100 Ω (101) |
| R19 | 7030003840 | Resistor | ERJ3GEYJ 225 V (2.2 MΩ) |
| R20 | 7030003490 | Resistor | ERJ3GEYJ 272 V (2.7 kΩ) |
| R21 | 7030003520 | Resistor | ERJ3GEYJ 472 V (4.7 kΩ) |
| R23 | 7030003710 | Resistor | ERJ3GEYJ 184 V (180 kΩ) |
| R24 | 7030003466 | Resistor | ERJ3GEYJ 152 V (1.5 kΩ) |
| R25 | 7030003320 | Resistor | ERJ3GEYJ 101 V (100 Ω) |
| R26 | 7030003680 | Resistor | ERJ3GEYJ 104 V (100 kΩ) |
| R27 | 7030003530 | Resistor | ERJ3GEYJ 562 V (5.6 kΩ) |
| R28 | 7030003680 | Resistor | ERJ3GEYJ 104 V (100 kΩ) |
| R29 | 7030003680 | Resistor | ERJ3GEYJ 104 V (100 kΩ) |
| R30 | 7030003680 | Resistor | ERJ3GEYJ 104 V (100 kΩ) |
| R31 | 7030003560 | Resistor | ERJ3GEYJ 103 V (10 kΩ) |
| R32 | 7030003600 | Resistor | ERJ3GEYJ 223 V (22 kΩ) |
| R33 | 7030003630 | Resistor | ERJ3GEYJ 393 V (39 kΩ) |
| R34 | 7030003760 | Resistor | ERJ3GEYJ 474 V (470 kΩ) |
| R36 | 7030003380 | Resistor | ERJ3GEYJ 331 V (330 Ω) |
| R37 | 7030003600 | Resistor | ERJ3GEYJ 223 V (22 kΩ) |
| R38 | 7030003480 | Resistor | ERJ3GEYJ 222 V (2.2 kΩ) |
| R39 | 7030003760 | Resistor | ERJ3GEYJ 474 V (470 kΩ) |
| R40 | 7030003640 | Resistor | ERJ3GEYJ 473 V (47 kΩ) |
| R42 | 7030003480 | Resistor | ERJ3GEYJ 222 V (2.2 kΩ) |
| R43 | 7030003320 | Resistor | ERJ3GEYJ 101 V (100 Ω) |
| C1 | 4030004760 | Ceramic | C2012 JF 1E 104Z-T-A |
| C2 | 4510001100 | Electrolytic | 16 MS7 10 μF |
| C3 | 4030006710 | Ceramic | C1608 SL 1H 470J-T-A |
| C4 | 4030006760 | Ceramic | C1608 SL 1H 121J-T-A |
| C5 | 4030004760 | Ceramic | C2012 JF 1E 104Z-T-A |
| C6 | 4030004760 | Ceramic | C2012 JF 1E 104Z-T-A |
| C7 | 4030004760 | Ceramic | C2012 JF 1E 104Z-T-A |
| C8 | 4030004760 | Ceramic | C2012 JF 1E 104Z-T-A |
| C9 | 4030006670 | Ceramic | C1608 SL 1H 270J-T-A |
| C10 | 4030006860 | Ceramic | C1608 JB 1H 102K-T-A |
| C11 | 4030006860 | Ceramic | C1608 JB 1H 102K-T-A |
| C12 | 4030006860 | Ceramic | C1608 JB 1H 102K-T-A |
| C13 | 4030006860 | Ceramic | C1608 JB 1H 102K-T-A |
| C14 | 4030006860 | Ceramic | C1608 JB 1H 102K-T-A |
| C15 | 4030006690 | Ceramic | C1608 SL 1H 330J-T-A |
| C16 | 4030006900 | Ceramic | C1608 JB 1E 103K-T-A |
| C17 | 4510001150 | Electrolytic | 50 MS7 R47 μF |
| C18 | 4030006860 | Ceramic | C1608 JB 1H 102K-T-A |
| C19 | 4510001160 | Electrolytic | 50 MS7 1 μF |
| C20 | 4030004760 | Ceramic | C2012 JF 1E 104Z-T-A |
| C21 | 4030006860 | Ceramic | C1608 JB 1H 102K-T-A |
| C22 | 4030005110 | Ceramic | C2012 JB 1E 473K-T-A |
| C23 | 4030004760 | Ceramic | C2012 JF 1E 104Z-T-A |
| C24 | 4030006900 | Ceramic | C1608 JB 1E 103K-T-A |
| C25 | 4030006900 | Ceramic | C1608 JB 1E 103K-T-A |
| C26 | 4030006470 | Ceramic | C2012 JB 1H 153K-T-A |
| C27 | 4030008660 | Ceramic | C2012 JB 1H 333K-T-A |
| C28 | 4030008660 | Ceramic | C2012 JB 1H 333K-T-A |
| C29 | 4030008670 | Ceramic | C2012 JB 1H 562K-T-A |
| C30 | 4030008670 | Ceramic | C2012 JB 1H 562K-T-A |
| C31 | 4030004760 | Ceramic | C2012 JF 1E 104Z-T-A |
| C32 | 4030004760 | Ceramic | C2012 JF 1E 104Z-T-A |
| C33 | 4030004760 | Ceramic | C2012 JF 1E 104Z-T-A |
| EP1 | 0910027112 | P.C. Board | B 2376B |

[IF UNIT]

| REF. NO. | ORDER NO. | DESCRIPTION | |
|----------|------------|----------------|-------------------------|
| IC1 | 1110002200 | IC | MC3372MR |
| Q1 | 1530002280 | Transistor | 2SC4081 T107 S |
| Q2 | 1530002280 | Transistor | 2SC4081 T107 S |
| Q3 | 1590000830 | Transistor | FMG2 T149 |
| Q4 | 1530002280 | Transistor | 2SC4081 T107 S |
| Q5 | 1590000520 | FET | 2SJ106-GR (TE85R) |
| Q6 | 1530002280 | Transistor | 2SC4081 T107 S |
| Q7 | 1530002280 | Transistor | 2SC4081 T107 S |
| D1 | 1730000490 | Zener | RD6.8M-T2B2 |
| D2 | 1790000490 | Diode | HSM88AS-TR |
| X1 | 6050003010 | Crystal | CR-166 |
| X2 | 6070000080 | Discriminator | CDB455C/6 |
| FI1 | 2020000550 | Ceramic Filter | CFUM455E |
| R1 | 7030003600 | Resistor | ERJ3GEYJ 223 V (22 kΩ) |
| R2 | 4610001360 | Trimmer | EVML1GA00 15 100KB |
| R4 | 7030003520 | Resistor | ERJ3GEYJ 472 V (4.7 kΩ) |

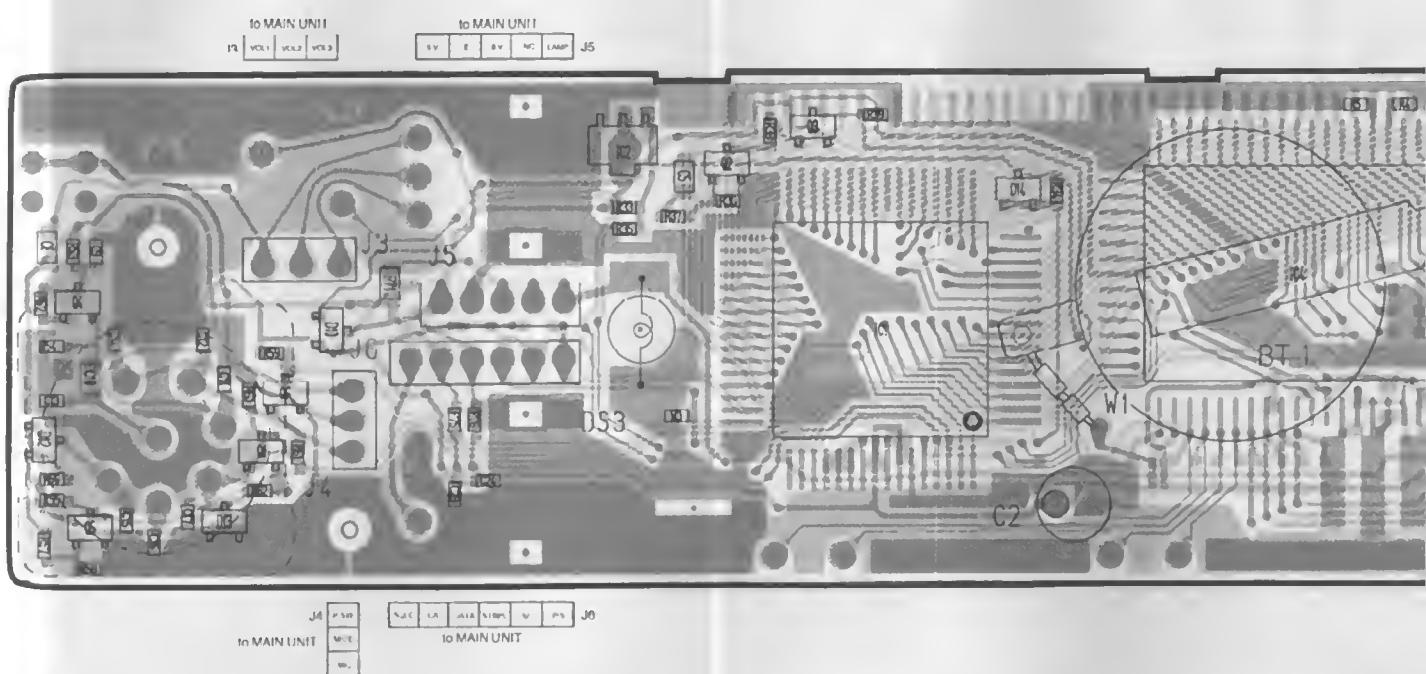
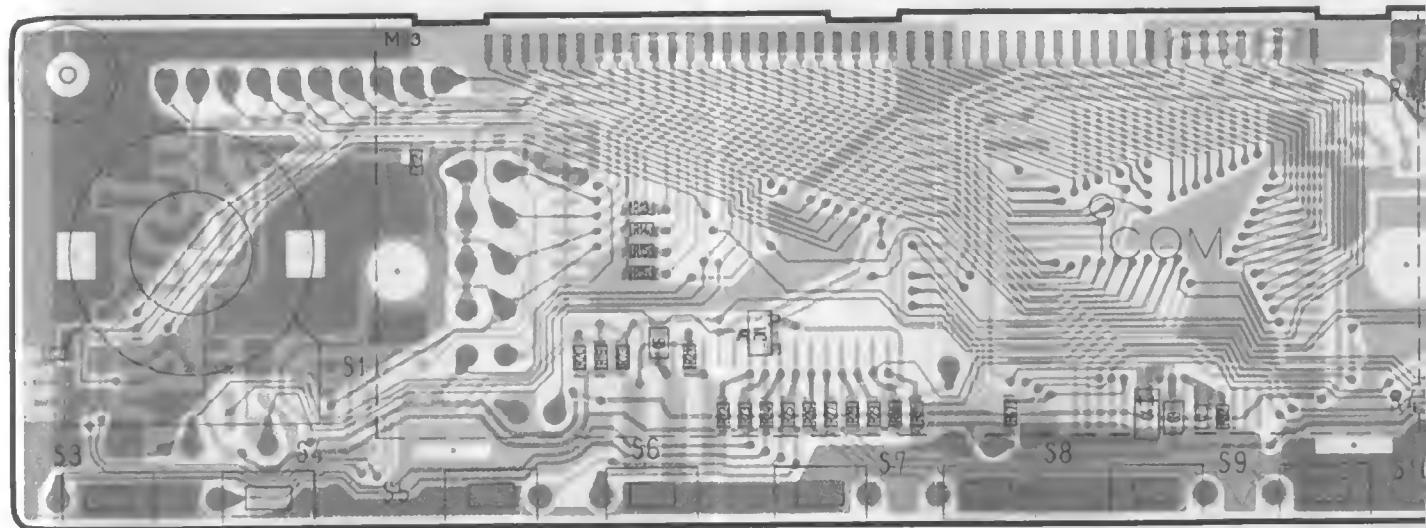
[TONE UNIT IC-229A/H (U.S.A ONLY)]

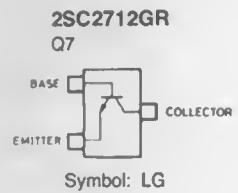
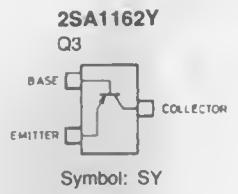
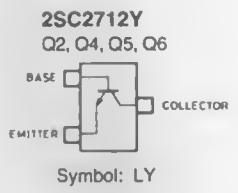
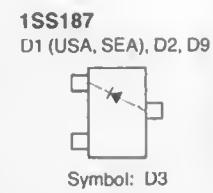
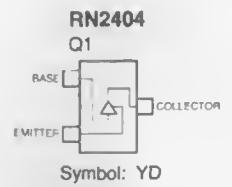
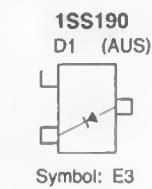
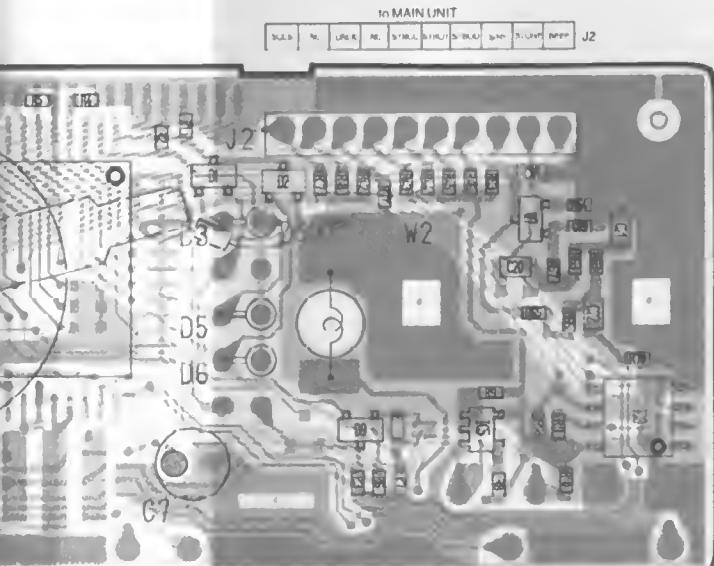
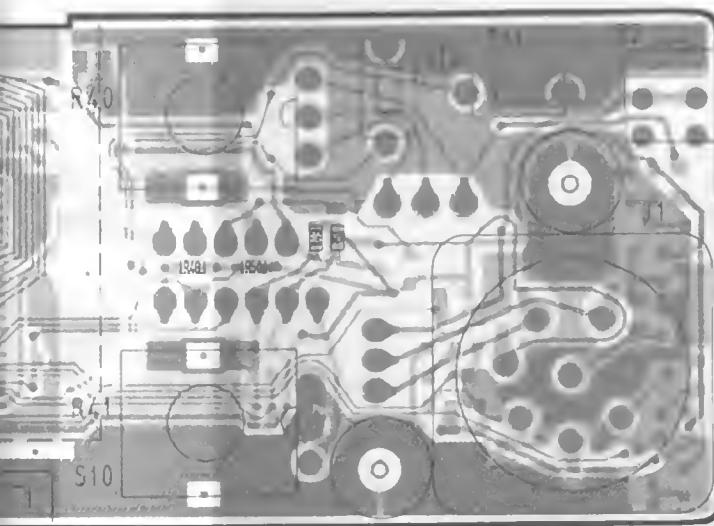
| REF. NO. | ORDER NO. | DESCRIPTION | |
|----------|------------|-------------|-----------------------------|
| IC1 | 1130000950 | IC | S7116A |
| IC2 | 1130000830 | IC | μ PD4094BG-T1 |
| Q1 | 1530002060 | Transistor | 2SC4081 T107 R |
| X1 | 6050006020 | Crystal | CR-288 |
| R1 | 7030003520 | Resistor | ERJ3GEYJ 472 V (4.7 kΩ) |
| R2 | 7030003620 | Resistor | ERJ3GEYJ 333 V (33 kΩ) |
| R3 | 7030003800 | Resistor | ERJ3GEYJ 105 V (1 MΩ) |
| R4 | 7030003460 | Resistor | ERJ3GEYJ 152 V (1.5 kΩ) |
| R5 | 7310002600 | Trimmer | RV-110 (RH03 A3AS4X0AA) 473 |
| C1 | 4030006850 | Ceramic | C1608 JB 1H 471K-T-A |
| C2 | 4550002950 | Tantalum | TESVA 0J 335M1-8L |
| C3 | 4550000530 | Tantalum | TESVA 1V 104M1-8L |
| C4 | 4030006690 | Ceramic | C1608 SL 1H 330J-T-A |
| C5 | 4030006690 | Ceramic | C1608 SL 1H 330J-T-A |
| C6 | 4550000270 | Tantalum | TESVA 1E 474M1-8L |
| EP1 | 0910020165 | P.C. Board | B 1942E |

Scan by Dan

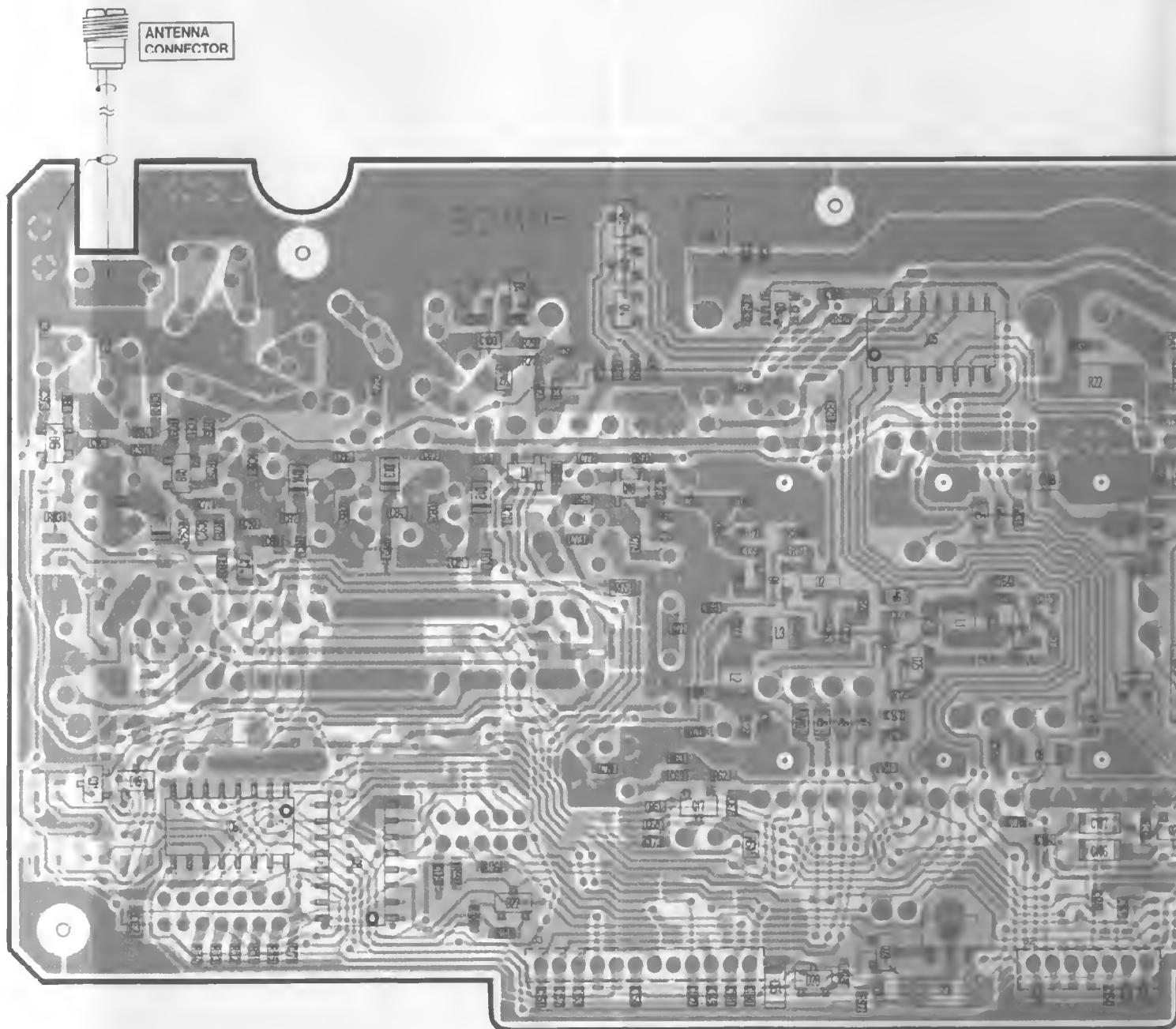
SECTION 8 BOARD LAYOUTS

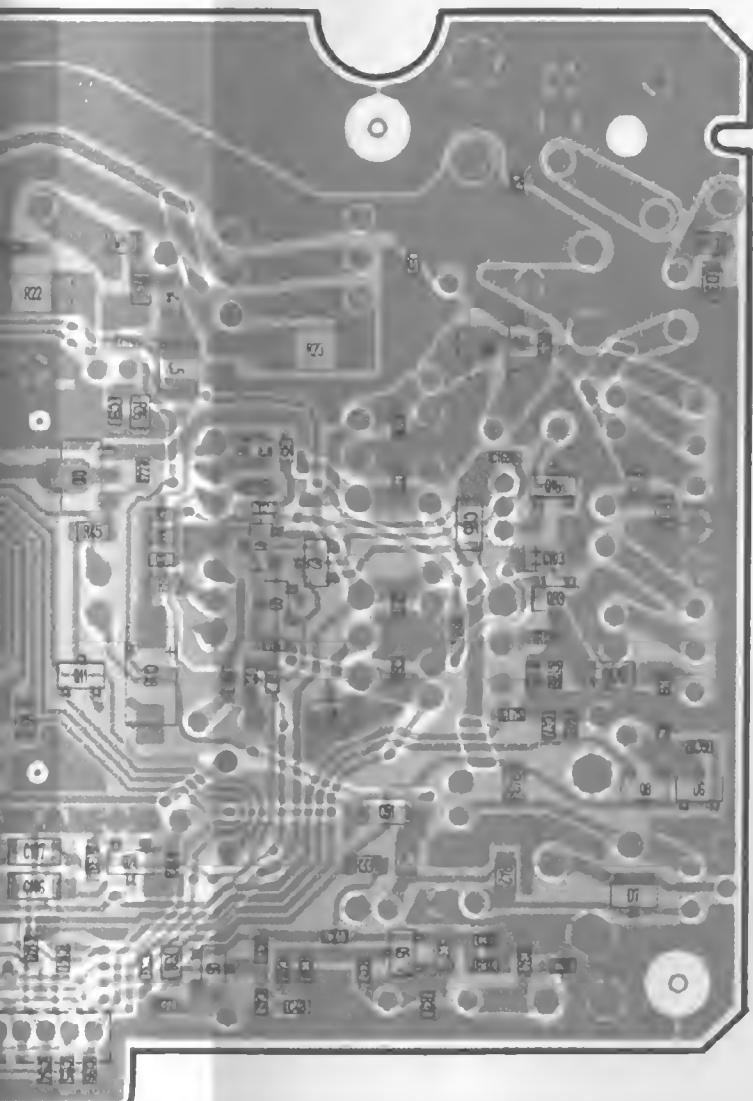
8-1 LOGIC UNIT





8-2 MAIN UNIT



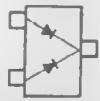


MA862
D1, D2, D11, D16, D21



Symbol: M1

1SS184
D19, D23



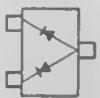
Symbol: B3

HSM88AS
D3, D4



Symbol: C1

1SS181
D22



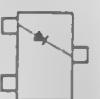
Symbol: A3

1SS193
D6, D7, D10



Symbol: F3

1SS153
D24



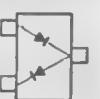
Symbol: A9

1SS190
D8, D28

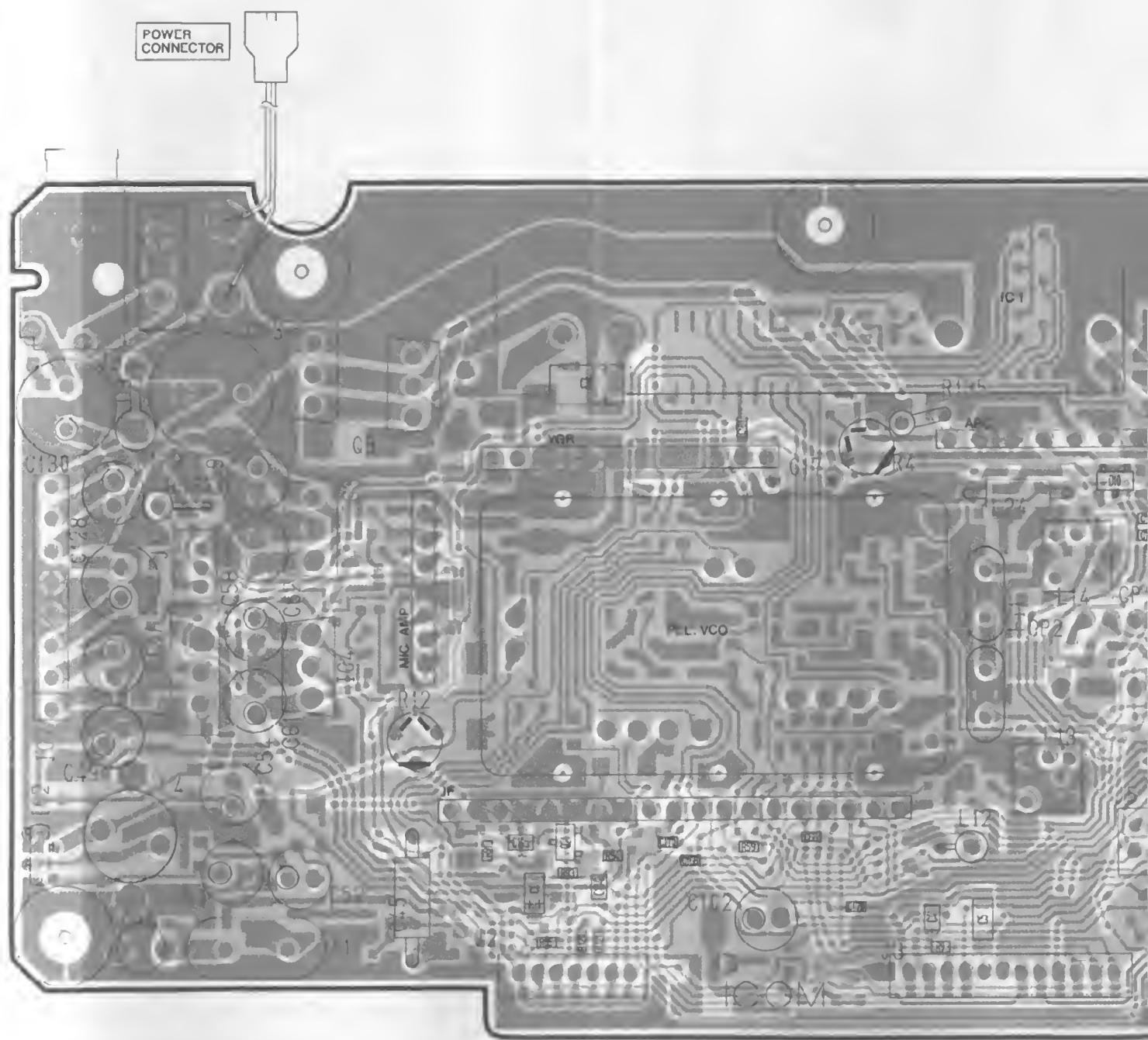


Symbol: E3

1SS226
D26



Symbol: C3



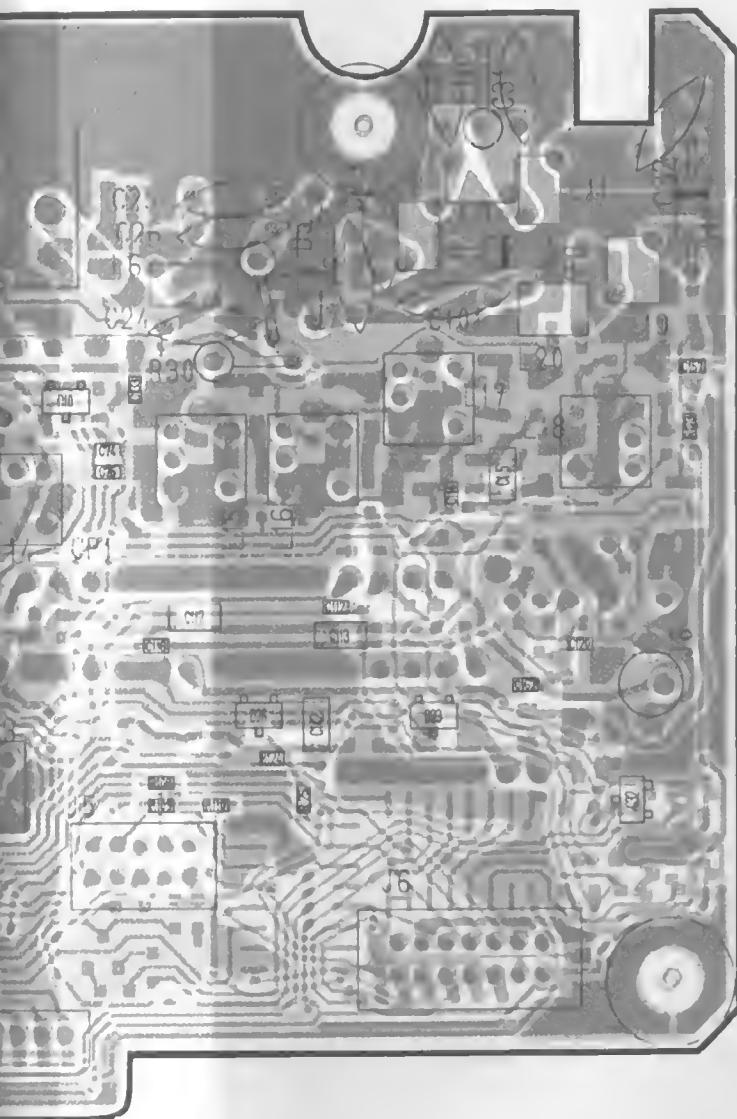
| | | | | | | | |
|----|----|----|------|------|----|-------|-----|
| J2 | 5V | 8V | LINK | DATA | CK | STBPL | RFP |
|----|----|----|------|------|----|-------|-----|

| | | | | | | |
|----|-------|----|-------|----|----|---|
| J3 | STBCC | SI | STONE | PS | NC | E |
|----|-------|----|-------|----|----|---|

2SJ106GR
Q1, Q2, Q24



Symbol: VG



NC E LAVD STB03 STB04 SOLC SOLS S/RF

2SC3661
Q0

Symbol: FY

RN1404
Q3, Q12, Q13, Q14

Symbol: XD

2SC3772½
Q5, Q6, Q17, Q20

Symbol: LY3, LY4

3SK177U73/U74
Q18, Q19

Symbol: U73/U74

2SB798DK
Q10, Q22

Symbol: DK

RN1402
Q25, Q31

Symbol: XB

2SC2712Y
Q11, Q21, Q23

Symbol: LY

DTB123EK
Q26, Q32

Symbol: FI2

2SA1736
Q15

Symbol: LD

2SC3326B
Q33

Symbol: CCB

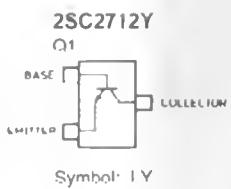
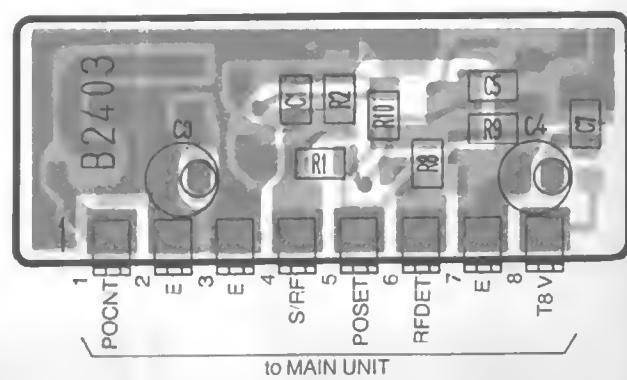
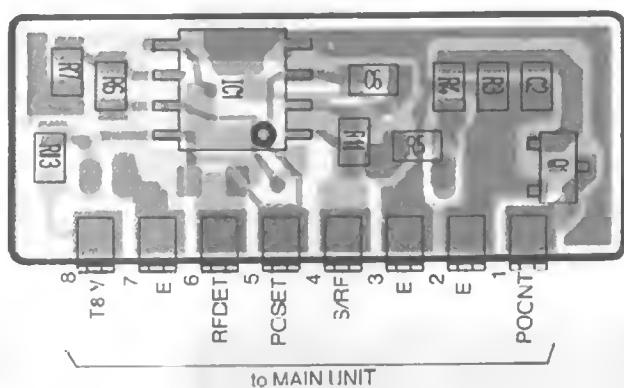
RN2427
Q16

Symbol: RG

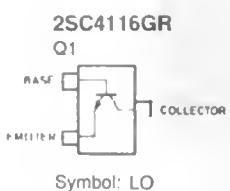
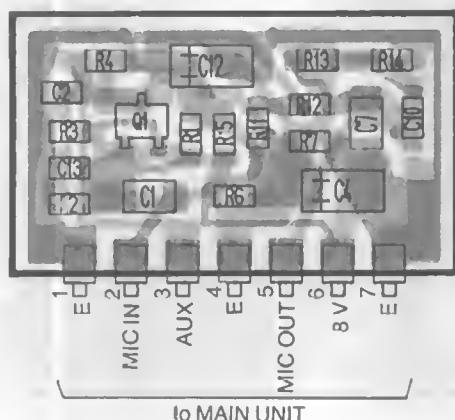
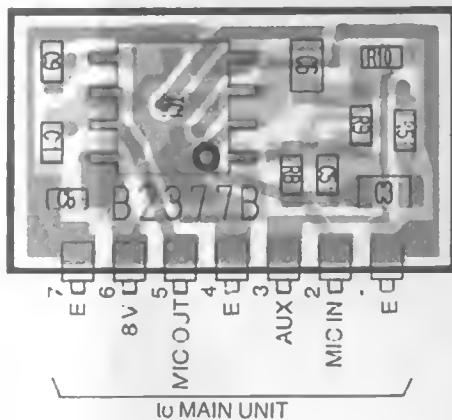
IMD6
Q34

Symbol: D6

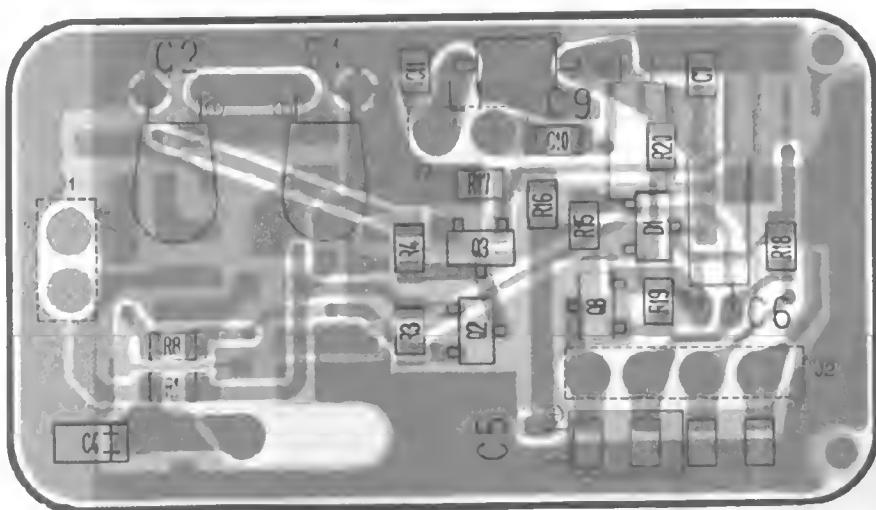
8-5 APC UNIT



8-6 MIC AMP UNIT



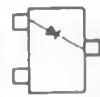
8-3 PLL UNIT



1SS193

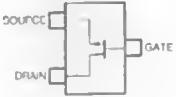
D

Symbol: E3

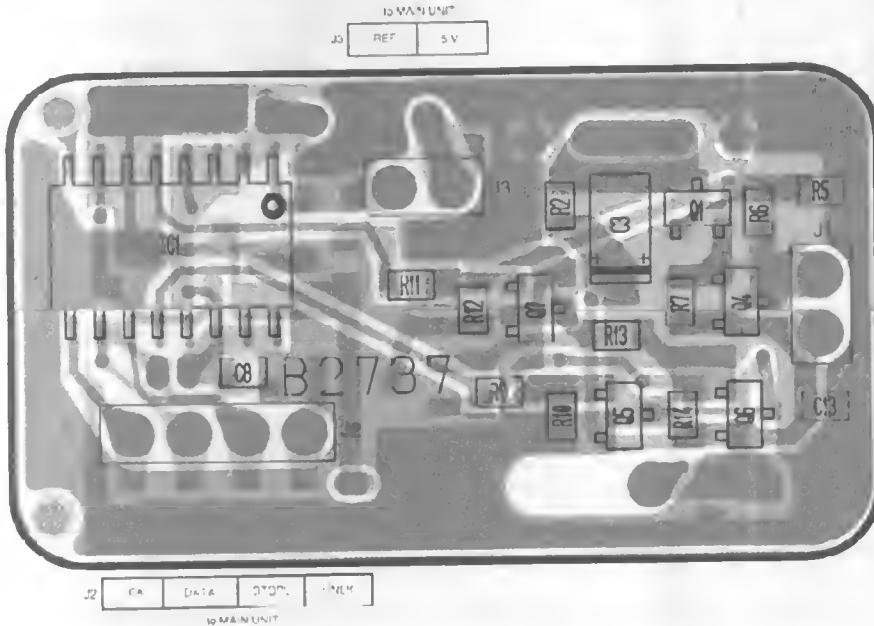


2SK209Y

Q1, Q2



Symbol: XY



J1
TUNER
30 V

2SA1162Y/GR

04.08



Symbol: SY, SG

2SC3324GR
Q5, Q7



Symbol: CBG

2SA1312BL
Q6



Symbol: ABB

8-4 VCO UNIT



2SK125
Q1



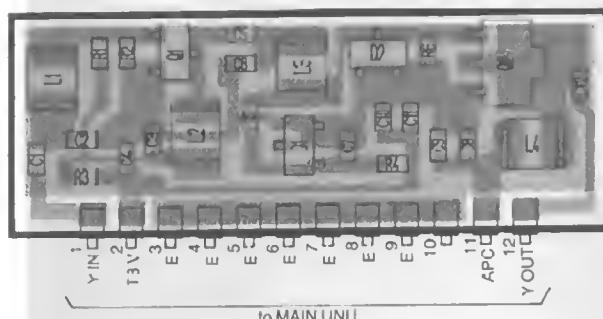
2SC3772^{3/4}
Q2, Q3, Q4

65



Symbol: LY3, LY4

8-7 YGR UNIT



1SS226

D1



Symbol: C3

2SC3775^{3/4}

Q1



Symbol: OY3/OY4

1SS193

D2



Symbol: F3

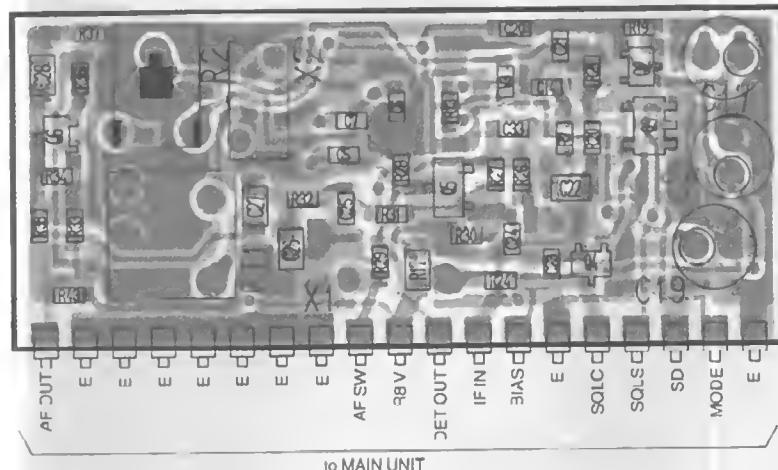
2SC2954

Q2



Symbol: QK

8-8 IF UNIT



RD6.2MB2

D1



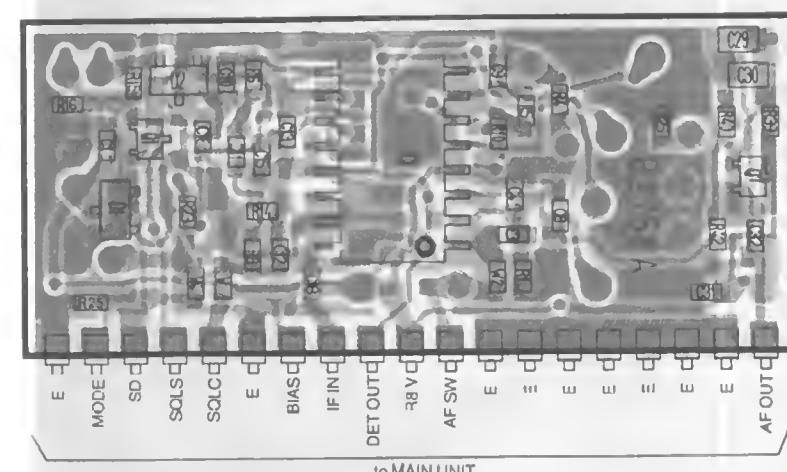
Symbol: 622

HSM88AS

D2



Symbol: C1



1SS193

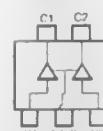
D3



Symbol: F3

FMG2

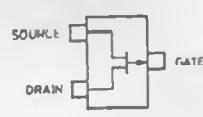
Q3



Symbol: G2

2SJ106GR

Q5



Symbol: VG

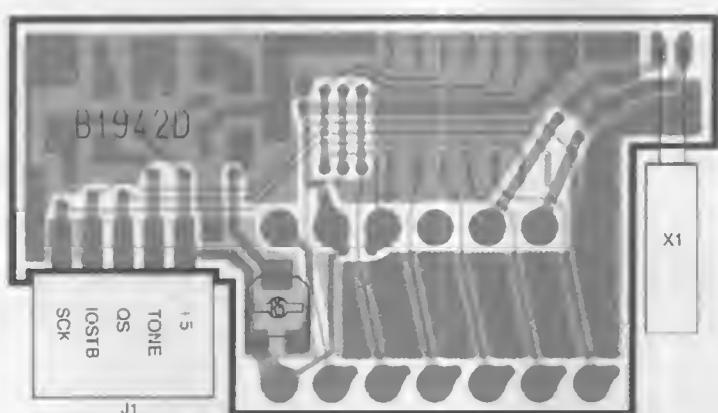
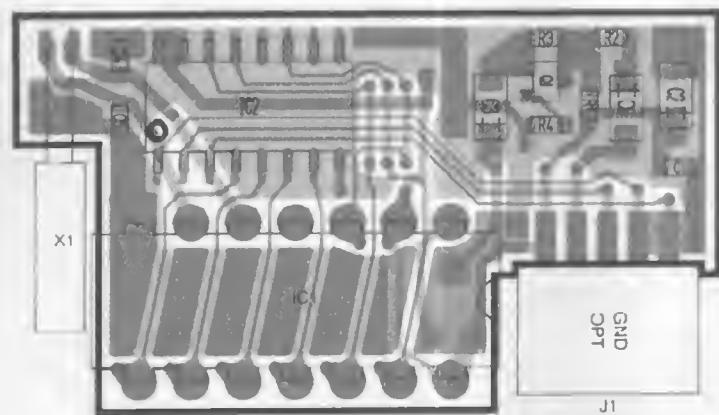
2SC4081S

Q1, Q2, Q4, Q6, Q7



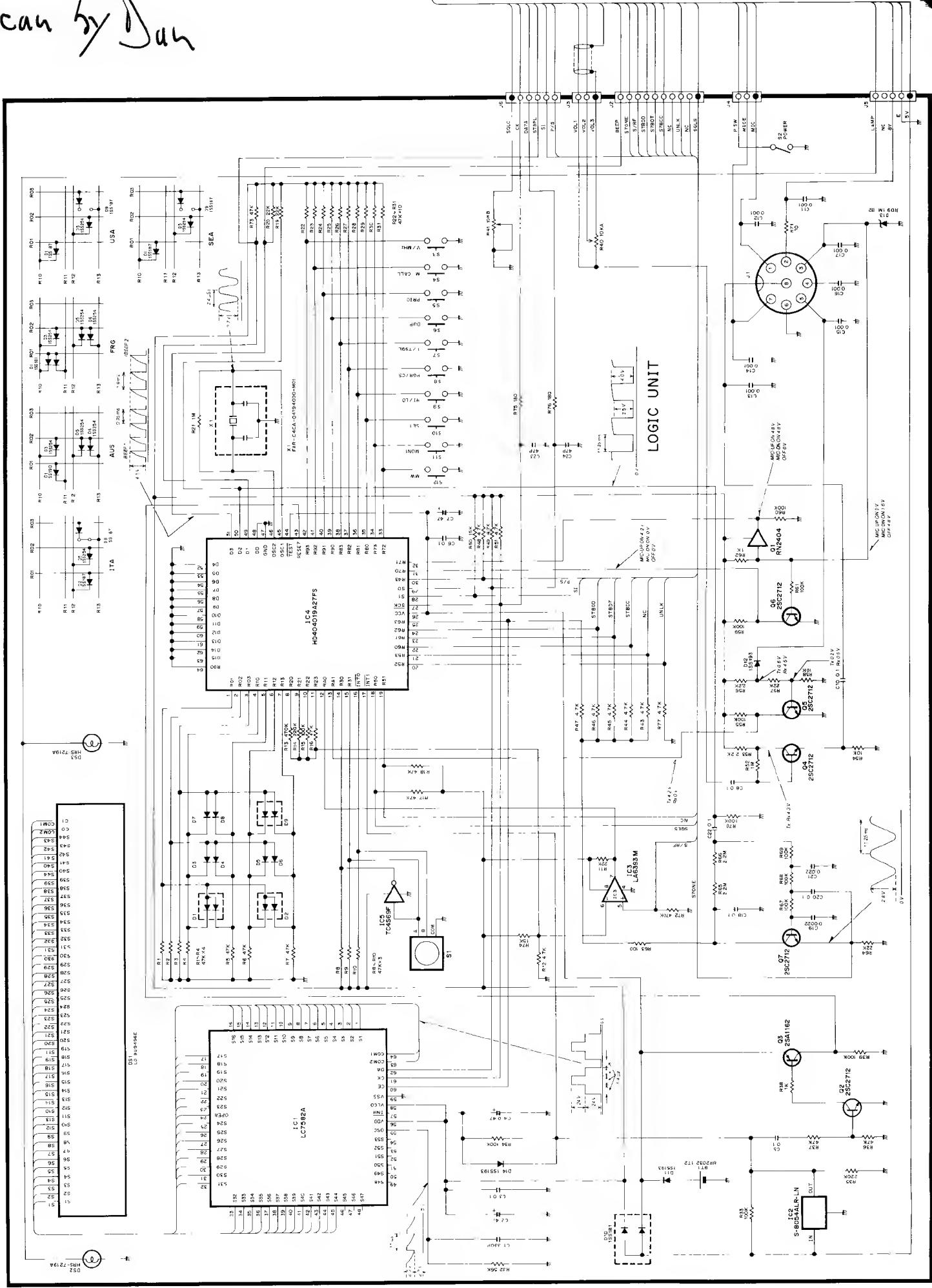
Symbol: BS

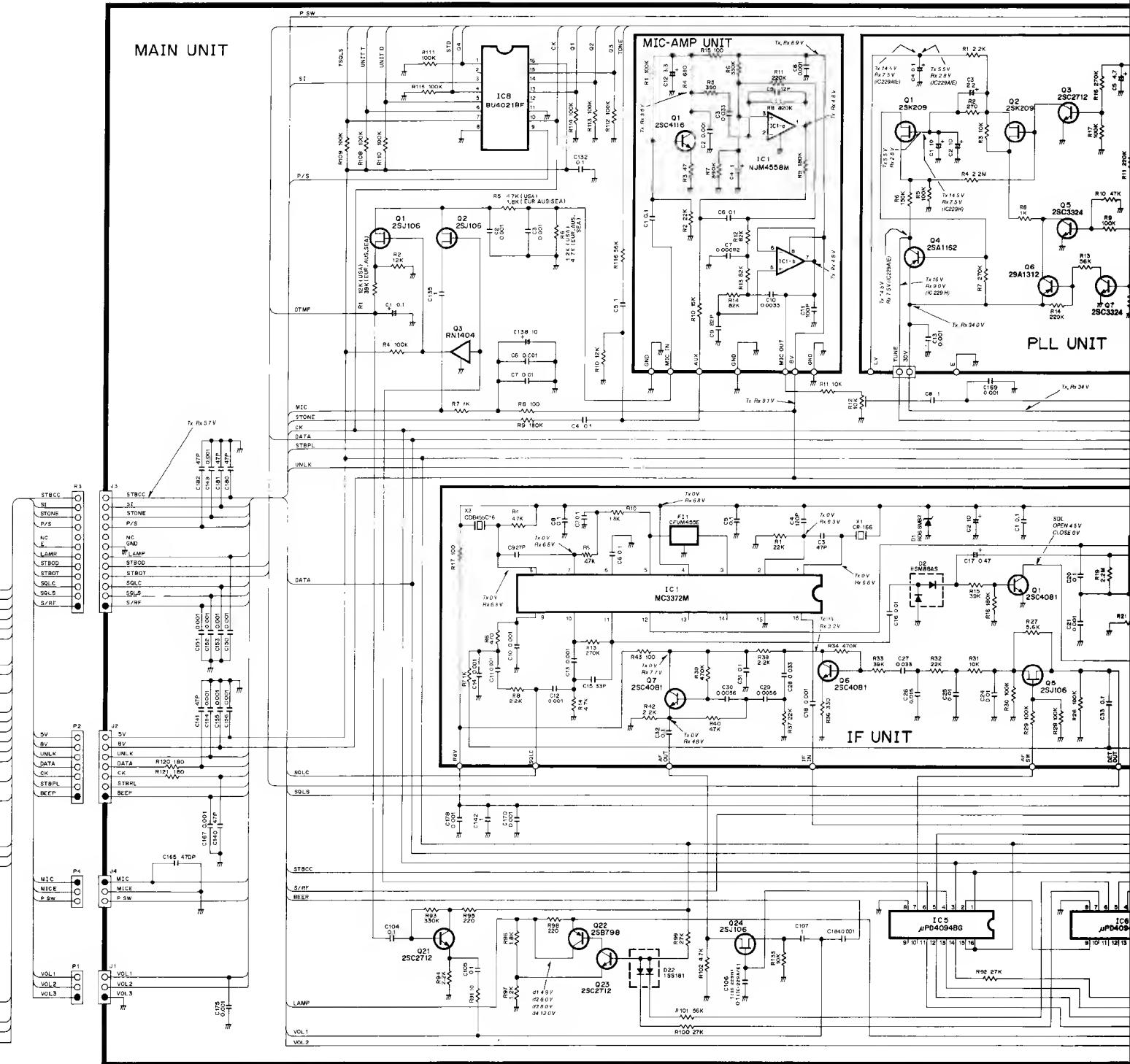
8-9 UT-51 TONE ENCODER UNIT (IC-229A/H USA Only)

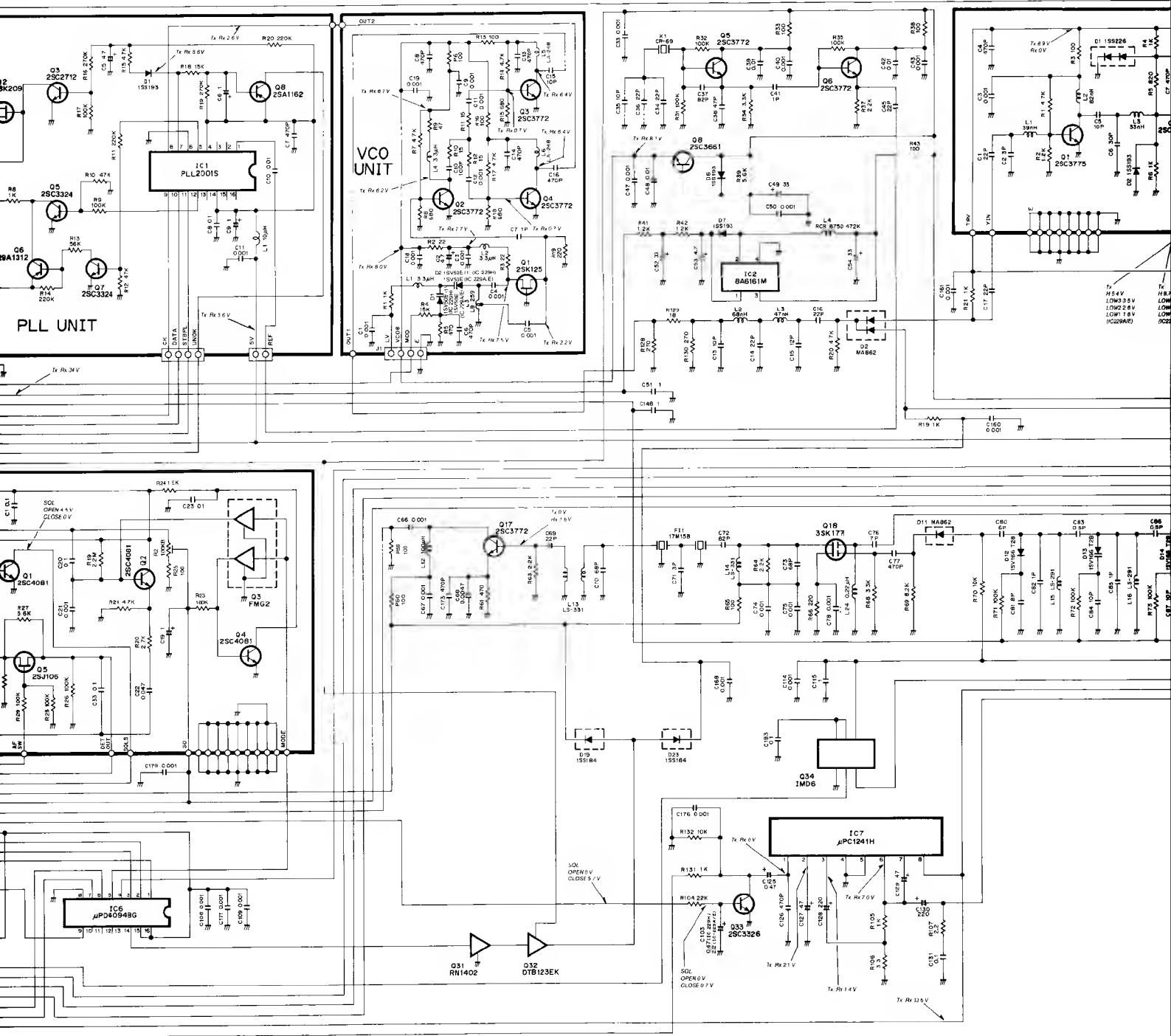


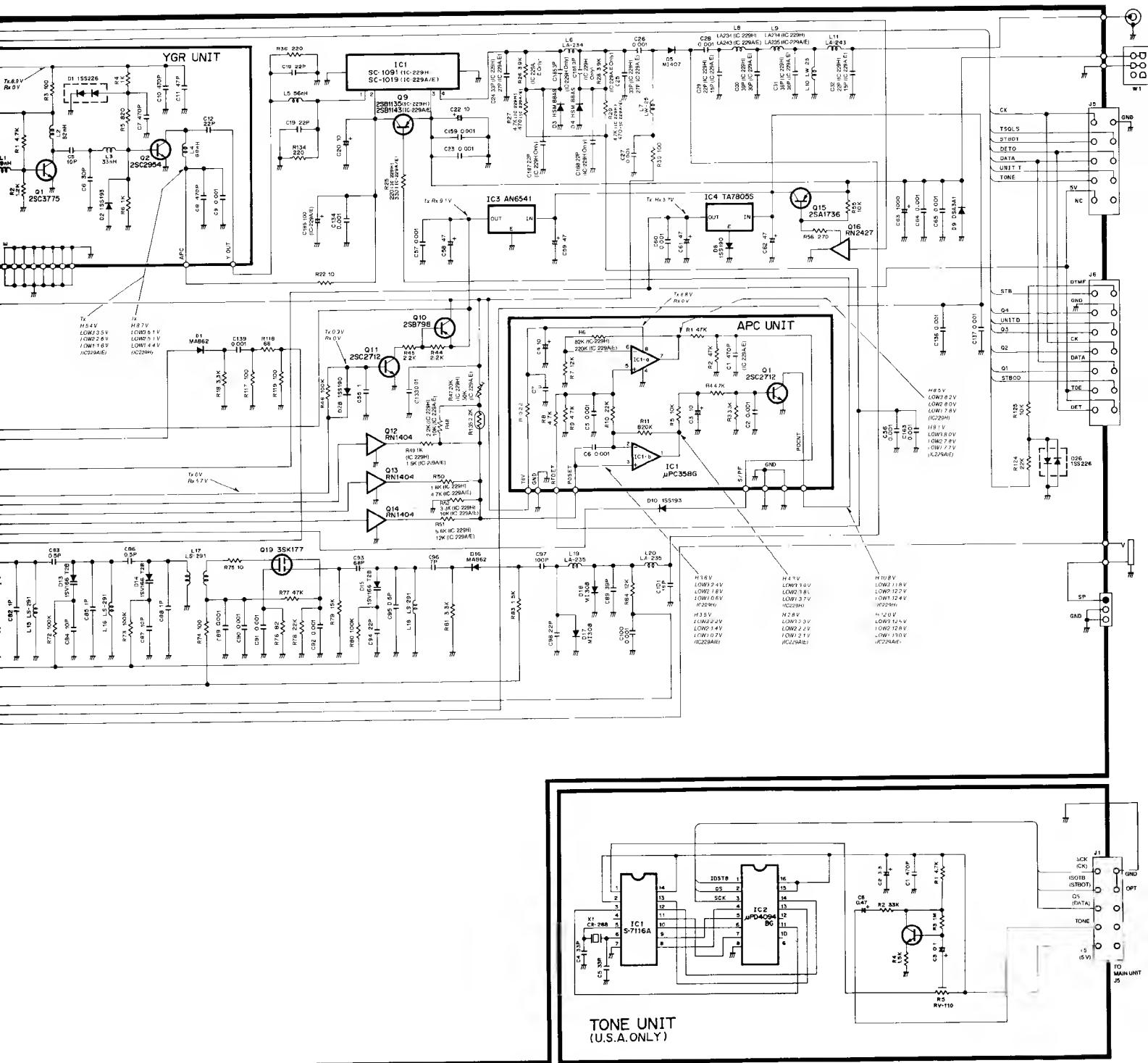
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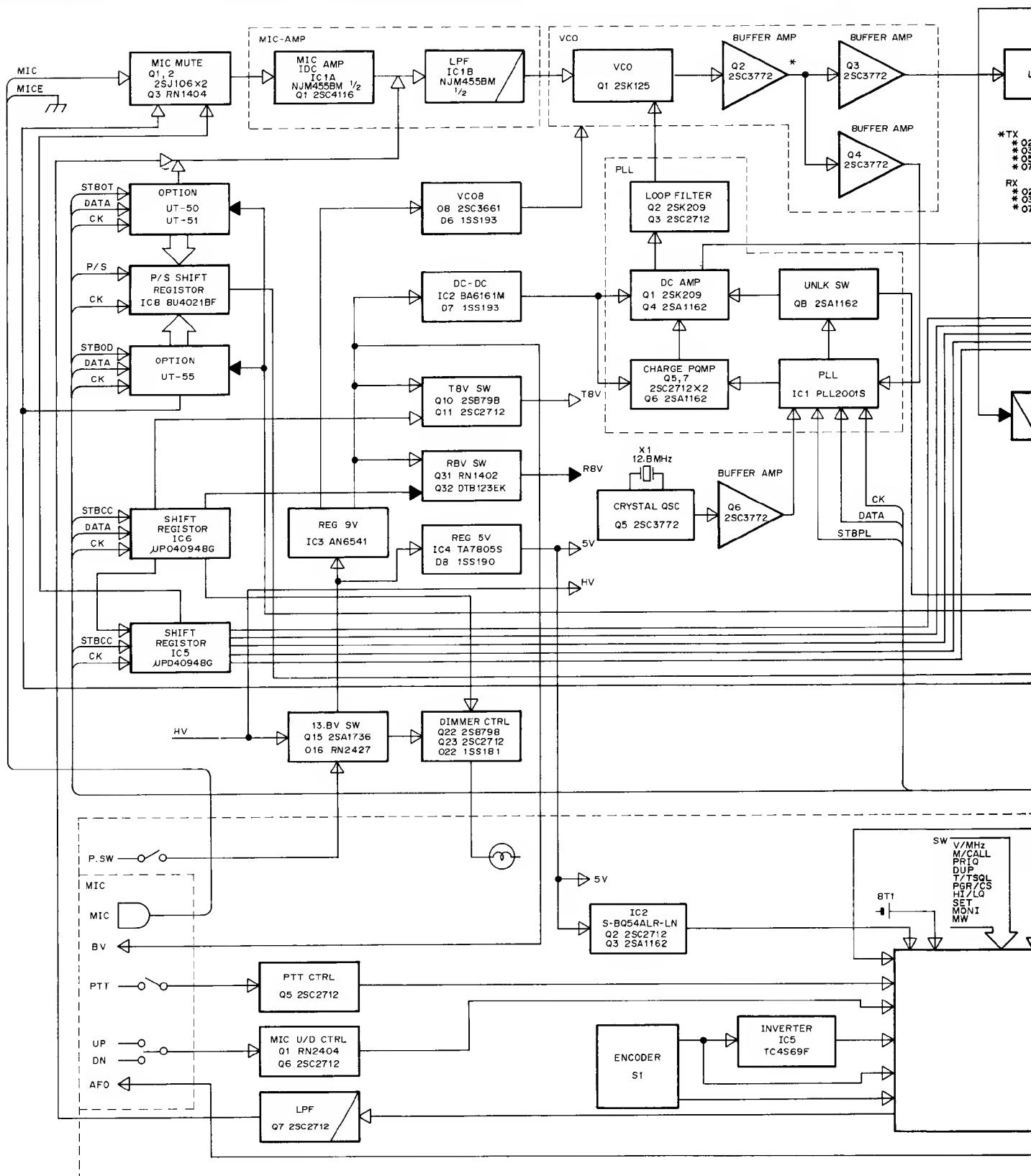


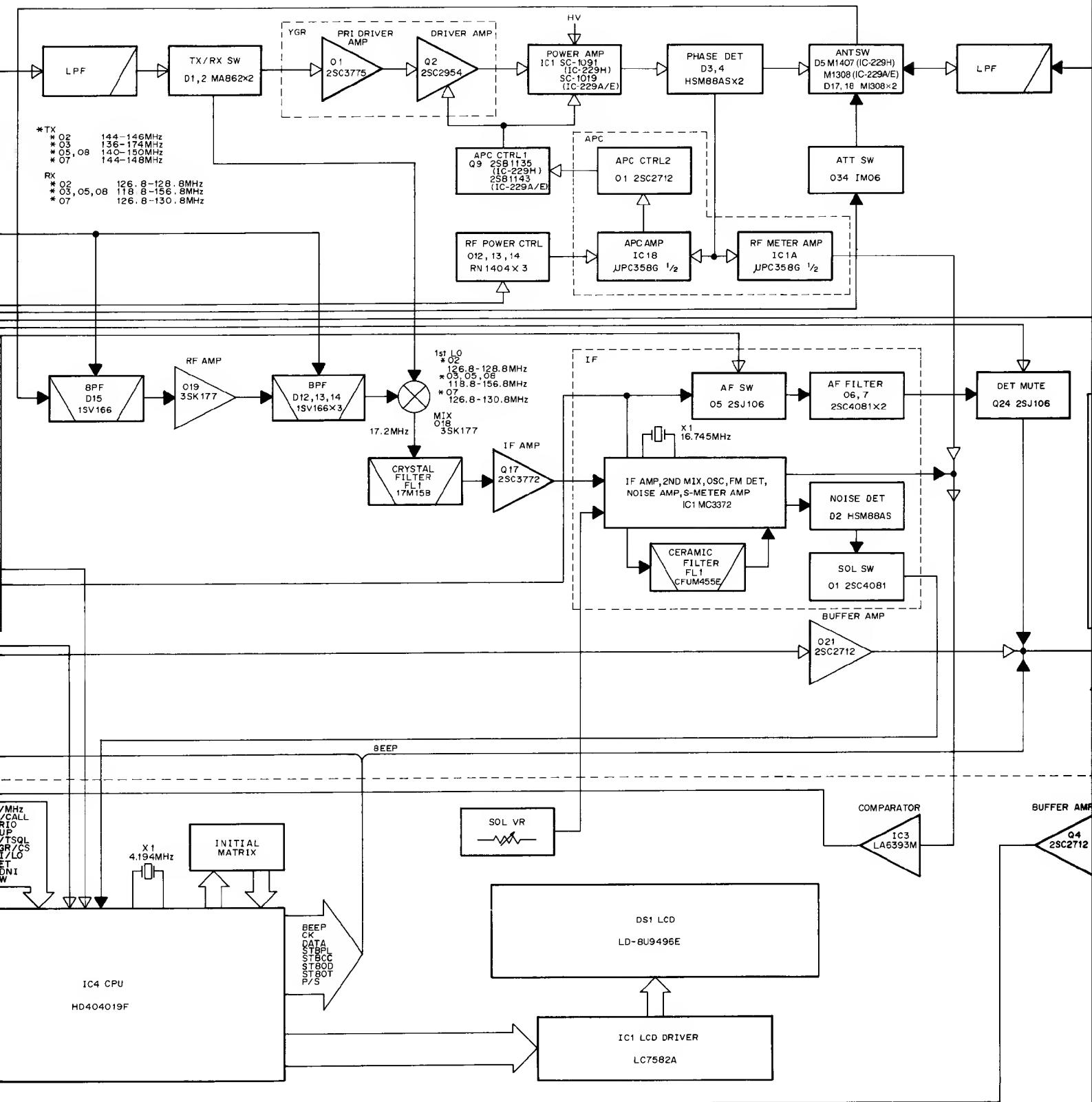


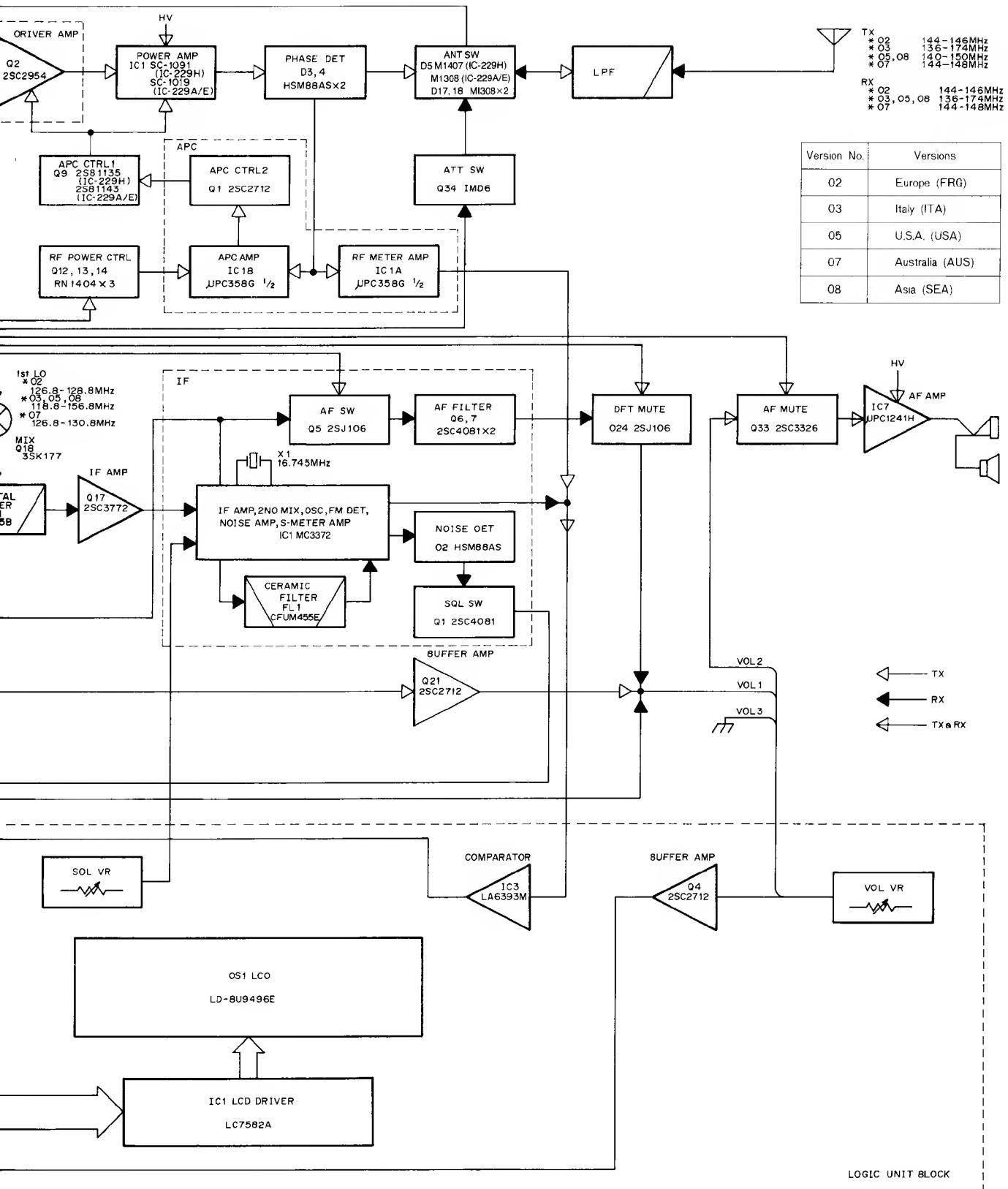


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SECTION 10 BLOCK DIAGRAM







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